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Contractors *and* Engineers Monthly

Vol. 46, No. 5

MAY, 1949

\$3 a Year, 50 Cents a Copy

Covering the Field

• Manage the Weather? Of Course

If cattlemen, farmers, and movie producers are doing it, why not contractors? The article on this page tells you how.

• Earth Dam for Flood Control

Fondulac Dam by name, and its 500,000-yard embankment will help protect East Peoria, Ill., against floods. See page 2.

• Los Angeles Freeway System

Work in progress is outlined on pages 6-7, together with the job story of a tricky 4-level grade separation.

• Equipment-Repair Shop

The winter of '49 gave mechanics in this district headquarters shop a workout they'll long remember. See page 14.

• County Airport Improved

Grading and drainage preparatory to paving make up this first-stage contract on a turf field. Refer to page 18.

• Buildings, Coast to Coast

Vermont is erecting a new office building to house its departments—page 23.

And in California, some 10,000 concrete piles were recently driven to support 18 new apartment buildings—page 74.

• Concrete Paving, 1948 Style

A stretch of the Lincoln Highway, built in the early 1920's, gets a 1948 reconstruction, as reported on page 33.

• Tunnel for Parkway

Construction of 1,200-foot tubes to carry Wilbur Cross Parkway traffic (page 38) saved money, mileage, and alignment.

• Highway Grading—Rock, Clay

The contractor on a rocky Nevada job gambled on rippers, and won (page 45).

Plenty of Georgia red clay was moved to relocate 10.5 miles of Route 10 (page 87).

• Floodwall and Levees

An industrial town on the Ohio River is now the safer for a new concrete floodwall and flanking levees. See page 49.

• Battle Against Erosion

Dirt-moving contractors are turning aside erosion attacks for Nebraska farmers by terracing work described on page 56.

• Why Safety Programs?

Because they pay off, and no doubt about it, explains a contractor, on page 61. He cites facts and figures.

• Roadside Development

On page 66 there's a review of the recent 8th Annual Ohio Short Course on Roadside Development.

• Two-Course Hot-Mix

Grading, gravel base, drainage, surface treatment, then plant-mix—the full story turns up on page 70.

• Tips on Aerial-Survey Photos

Massachusetts has some as a result of its study of scale, focal length, season, mosaics, obliques, etc. Turn to page 80.

• Scaling From Abrasives

There's a way to prevent it, New York has found after exhaustive tests. It shares its findings on page 98.

(You will find "In This Issue" on page 4)

"Weather Management" Raises Contract Profits

A BIG PILE-DRIVING JOB

Accurate Weather Data Can Help Contractors To Increase Job Profit With Lower Bid Prices

By RAYMOND P. DAY,
Western Editor

† NO doubt about it, the contractor was worried.

"I'm afraid we got caught with our pants down, Joe," he said to his superintendent. "Look at these old flood charts for Rising Creek."

Joe, his general superintendent for the small dam job the company had taken in the middle of the summer, studied the tables of statistics.

"Good Lord!" he exploded. "An inch of rain will overtop our diversion flume, and 2 inches will ruin us. They've had that kind of storm repeatedly here on Rising Creek. What'll we do? We should have had that dope handy when we slipped in that bid of ours."

"I know, Joe. But we didn't. Or at least we didn't know where to get it."

The big superintendent swore. "Hell, I don't know what to do," he said. "Looks like we have just two choices. We can either pull everything off now and try to save what we've got, or hire all the extra men and equipment we can find to try to finish up in 60 days. That'll cost a lot of money, overtime pay and all."

The contractor pondered for a moment. "We've got a third choice, Joe," he said. "It may save us money. I've got a hunch."

Picking up the telephone, he called a licensed independent weather service. Explaining the problem in detail to their experts, he filled in extra facts one by one. "I'm willing to go along with whatever you tell me," he finished. "When can I have your answer?"

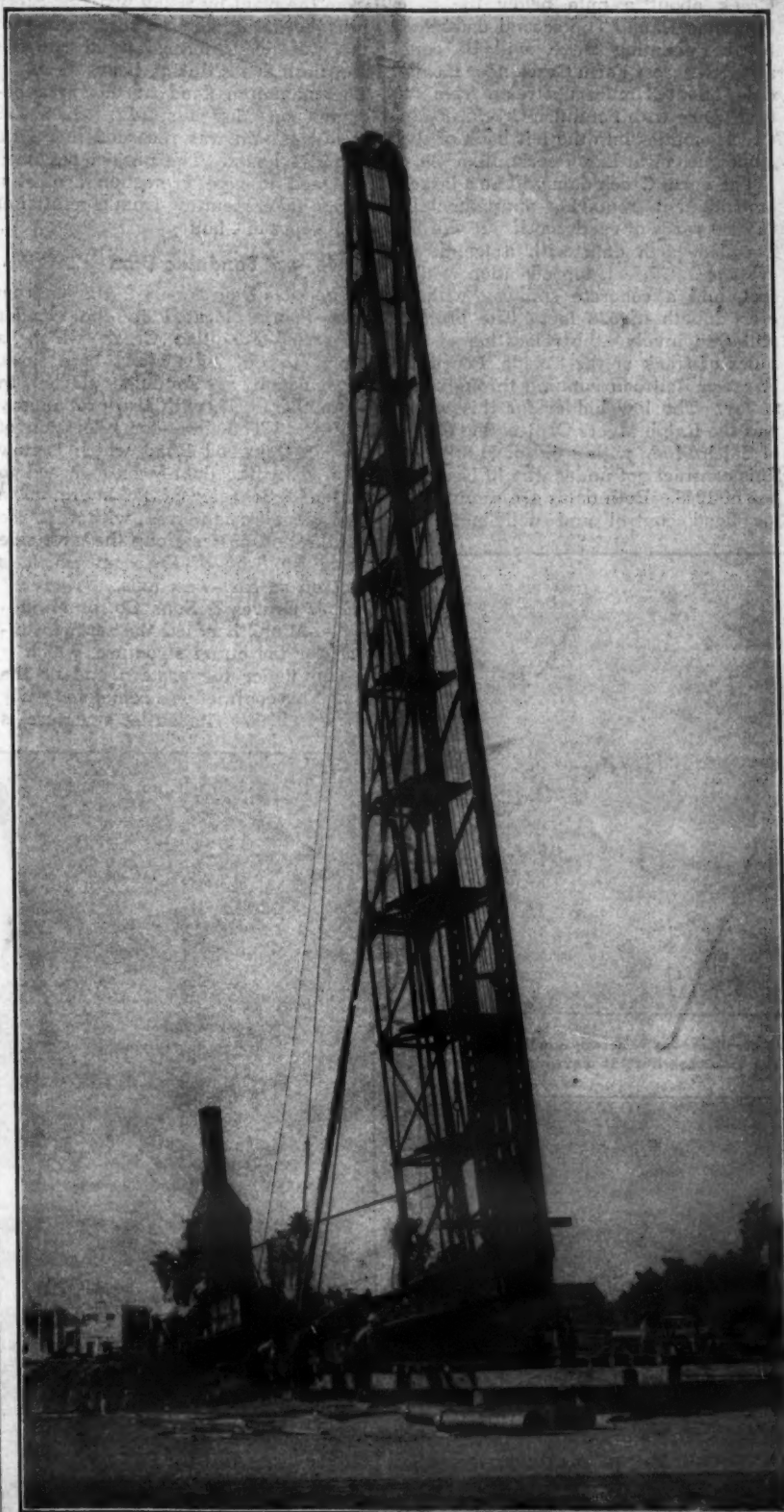
Two weeks later, after an intensive study by meteorological science, he received the report.

"Go ahead with your work at no accelerated pace," it said. "While it is true that Rising Creek at your dam is subject to severe floods, this will be a dry year. On the basis of our studies, the rains you will get will be of short duration, and your diversion flume will carry the water with 9 inches of free-board to spare."

The flume filled to within 10 inches—twice. The inch of error was caused by the various imponderables in estimating the ability of the ground to soak up the first rain. The job was finished on time at a profit. And another contractor became a friend and booster of specialized private weather service.

Jobs and the Weather

Curious to know how much contract profit is now being wasted on account
(Continued on page 20)



C. & E. M. Photo

Coming up a sharp incline on its hardwood rollers, this Raymond Concrete Pile Co. pile driver is about to "break over" as it moves away from a completed concrete-pile foundation on the Parklawn Housing Project, Los Angeles. See the story on page 74.



C. & E. M. Photo
Central Engineering Co. obtained pervious material for the downstream side of Fondulac Dam from this borrow pit, where a Lorain shovel is shown loading a 4-yard truck.

Rolled-Earth Dam Is Built Against Floods

More Than 500,000 Yards Of Material Required for Embankment to Protect Illinois Industrial Area

By WILLIAM H. QUIRK,
Eastern Editor

THE Department of the Army, Corps of Engineers plan for protecting the industrial area of East Peoria, Ill., against floods will be realized in part late this summer when the new Fondulac Dam is scheduled for completion. This rolled-earth dam, containing over 500,000 yards of pervious and impervious material, is part of what is known as the Farm Creek Flood Control Project. The overall project calls for the construction of two dams as well as channel improvements within the city of East Peoria.

The first dam, now under way and discussed in detail in this article, is on

Fondulac Creek which flows into Farm Creek about a mile below the new Fondulac Dam. The second dam, still in the planning stage, will be constructed across Farm Creek near Farmdale, about 3 miles upstream from its confluence with Fondulac Creek. Farm Creek empties into the left bank of the Illinois River at East Peoria, Ill.

The Farm Creek dam will be a larger embankment, requiring approximately 725,000 yards of earth work. It will be a rolled-earth dam with a length at crest of 1,275 feet, top elevation of 631 feet, and a concrete spillway with a crest length of 528 feet. The project will also involve the relocation of 4.5 miles of track of the Toledo, Peoria & Western Railroad running through the valley. The low bidder for this work was the Ralph Myers Contracting Corp. of Salem, Ind., with a bid of \$1,858,430. This contract got under way in December of 1948. Both dams are essentially for flood control and will have no



Corps of Engineers Photo
As trucks end-dumped the coarse gravelly material on the fill, it was saturated by a stream of water from a 2½-inch fire hose. William H. Melan subbed this work.

permanent pools backed up behind them. The Chicago District of the Corps of Engineers is supervising the project.

Severe floods have struck this heavy industrial area in the past. Among the industries crippled by them has been the huge Caterpillar Tractor Co., where some 23,000 employees were driven from the plant by rising waters. Steep hills bordering the narrow valleys of the waterways induce rapid run-offs and flash floods during heavy rainfalls. The maximum flood in this area occurred on May 18, 1927, when 4.19 inches of rain was recorded in Peoria within 4 hours. The project has been designed to give protection against a design flood resulting from a rainfall of 4.70 inches in 4 hours.

Fondulac Dam

Fondulac Dam is only 2½ miles from East Peoria, located in the slender valley of Fondulac Creek which is rimmed in by hills along both sides. Construction at Fondulac started in September, 1947, with two preliminary contracts. The first—for relocation of the old Oakwood Road which is now covered by the dam—was awarded to Jansen & Schaefer of Pekin, Ill. The road was completed within three months, and passes along the west side of the spillway of the dam which is built on an east-west axis.

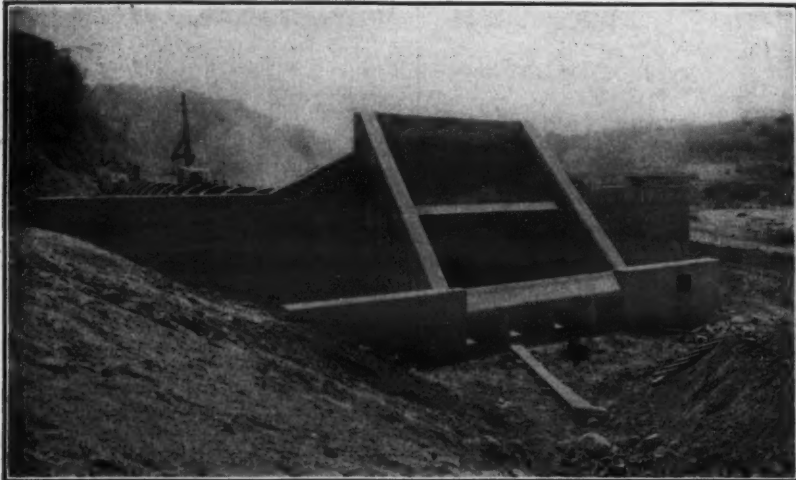
S. J. Groves & Sons Co. of Minneapolis, Minn., handled the second contract for the outlet structure, which is located under the eastern end of the dam. This contract was completed early in July, 1948. The outlet structure is

uncontrolled; that is, it has no gates or similar regulating appurtenances. It consists of an inlet structure; a concrete conduit 395 feet long and 5 feet in diameter which is constricted to a 3-foot diameter at the intake end; and a stilling basin. The flow line of the conduit is about 5 feet below the existing ground surface.

The outlet structure serves the following purposes: (1) passes ordinary dry-weather flow through the dam without impoundment; (2) empties the reservoir after impoundment due to heavy rains; (3) restricts the flow in Fondulac Creek below the dam so that there will be no bank overflow in times of high water.

The dam itself is of rolled-earth construction with a length of about 1,000 feet, a maximum height of 67 feet, a top width of 20 feet, and a maximum base width of 479 feet. Its top elevation is 597. The access road is carried across the dam from the east side, to end at the spillway on the west side. The spillway is a concrete-paved chute with a crest width of 100 feet and a length of about 235 feet measured from spillway crest to the beginning of the stilling basin. The spillway is provided as a safety valve to prevent the dam from being overtopped and failing. When water in the reservoir rises to within 18 feet of the top of the dam, it will begin to discharge into the spillway which will carry it to a point downstream of the dam. It is estimated that water may flow through the spillway once in 600 years.

(Continued on next page)



Corps of Engineers Photo
Under the eastern end of the dam is the outlet structure—a concrete conduit 395 feet long and 5 feet in diameter except here at the intake, where it narrows to 3 feet.



Corps of Engineers Photo
S. J. Groves & Sons Co. completed the outlet structure—shown here from its discharge end, with riprap in place—early in July, 1948, under a preliminary contract.



C. & E. M. Photo
Here an orange peel bucket hung from an A-frame and hoist excavates for a concrete-pipe drainage well designed to relieve water pressure that may build up under the dam.



C. & E. M. Photo

Much impervious material came from this borrow pit on top of a hill at the west side of the dam. Tractor-scrappers navigated steep grades getting to and from it.

The drainage area of the dam is 5.4 square miles, or 9 per cent of the total Farm Creek watershed. At spillway crest the reservoir area would be 97 acres with a capacity of 2,280 acre-feet. The freeboard above maximum pool elevation is 4.8 feet.

In all, around 508,400 cubic yards of earth will be required to construct the dam, which is estimated to cost \$1,548,000.

Main Contract

The main contract for the construction of the embankment and spillway was awarded by the Corps of Engineers to the Central Engineering Co. of Davenport, Iowa, on its low bid of \$988,000. The contractor began clearing operations in February, 1947, and two months later started stripping the site and also a borrow pit from which pervious material was obtained.

The pervious material is placed only on the downstream side of the dam. It extends from a point 5 feet back from the top of the dam and forms a wedge with an inside slope of 1 to 1 to original ground, and with outside slopes of 2 3/4 to 1 at the top and flattening out to 6 to 1 at the bottom. The pervious material amounts to about 132,000 cubic yards. The remainder, and greater portion of the embankment, totaling 376,000 cubic yards, is built of selected impervious fill. The upstream slope face flattens from 3 to 1 at the top to 4 1/2 to 1 at the bottom. The area upstream of the toe of slope is also covered with an impervious blanket 8 feet thick and about 240 feet wide. This is to retard the seepage of the ponded water into the pervious substrata. Both pervious and impervious material was placed in 8-inch lifts and compacted to 95 per cent of maximum density at optimum moisture.

Fondulac Creek flows through the center of the valley at the dam site. Accordingly, the first large-scale excavation operations were digging a diversion channel from the existing waterway along the east side of the site.

The new creek channel then ran past the axis of the dam along the west side of the new concrete outlet conduit. This permitted the construction of the western portion of the embankment. When this end was built to elevation 565, the closure section followed. A cofferdam was built for the closure with a top elevation of 565, and this later served as part of the embankment. During the final stages of the earth work the water from the creek passed through the outlet structure, and if this conduit was flowing full the remainder was impounded behind the cofferdam.

Impervious material for the embankment was obtained from three sources: excavation for the access road, excavation for the spillway, and from a borrow pit on top of a hill at the west side of the spillway. The cuts for the access road yielded only about 15,000 yards, so the bulk of the impervious clayey soils came out of the spillway or off the hill. All the pervious material came from one borrow pit on the south side of

U. S. 24. The excavation of pervious material from the pit, and the placing of it in the embankment, was sublet to William H. Nelan, an East Peoria, Ill., contractor.



C. & E. M. Photo

Here a LaPlant-Choate scraper unloads impervious material on the fill, and four LaPlant-Choate sheepsfoot roller drums pulled by D8's compact it.

Impervious Material

For digging out the impervious material from the approach channel to the spillway and the impervious-borrow area, the Central Engineering Co. used

5 LaPlant-Choate 14-yard scrapers pulled by Caterpillar D8 tractors. Later in the job 4 Caterpillar scrapers were obtained, and these were pulled (Continued on page 30)

When traffic called for
heavy-duty paving--



--these four major cities laid
resilient, joint-free TEXACO

Photographs

- (1) Worcester, Mass., has paved many of its busiest thoroughfares with Texaco Asphaltic Concrete.
- (2) A 23-year-old Texaco Sheet Asphalt pavement on Broad Street, Trenton, N. J.
- (3) Wilmington, N. C., paved Front Street from beginning to end with Texaco Asphalt.
- (4) A typical Texaco Asphalt pavement on the street system of Corpus Christi, Texas.

When your proposed pavement must withstand heavy, continuous traffic, follow the example of these four large cities. Under the severe traffic conditions found on the busy thoroughfares shown here, all four cities constructed Texaco Asphalt paving of the plant-mixed types. The Trenton, N.J. pavement, now more than 20 years old, has required a minimum of maintenance. Its present condition insures many additional years of satisfactory service.

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TEXACO ASPHALT

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For the Highway and Heavy-Construction Industry

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How Shall We Pay for Our Highways?

Our most critical highway problem—financing our highway programs—comes up for discussion wherever two or three highway people are gathered together. At the recent convention of the Association of Highway Officials of the North Atlantic States, one session was given over to the subject. And a concise and cogent analysis of the financing problem was made by Roy E. Jorgensen, Deputy Commissioner and Chief Engineer of the Connecticut State Highway Department, who presided at that session.

Mr. Jorgensen said:

"The easy answers to why we have a financial problem are familiar to all of you. (1) The wartime lapse in construction put us at least 4 years behind. (2) Increased costs have reduced accomplishment per dollar to one-half the pre-war level; but highway revenues, not being geared to the cost level, have not provided a corresponding increase in funds. (3) We now recognize the full magnitude of our road needs, whether they be urban or rural. In many of our states, our responsibilities have thereby been greatly increased.

"These reasons for the existence of a critical financial problem are clear to us in the highway business. But these reasons do not necessarily suggest to our legislators and to the motoring public that something must be done about the financial problem. It could be, and is, the position of some of those disinterested in the highway program that: pre-war highway development provides no yardstick; the wartime lapse in construction didn't finish off highway transportation, so why should there be great concern at a 'moderate' program now; and urban highways, such as the states contemplate, are too costly and too destructive of property to be justified.

"We think we have good answers for such observations. But something is lacking. We fail to demonstrate that wise public policy leaves no alternative to a vigorous redevelopment of our highways.

"Highway engineers have reached a high level of technical competence in the planning of highway systems and individual improvements. Many of our states have made comprehensive studies and reports on their total road needs. We show in these reports the necessity of improvements in terms of width, curvature, sight distance, etc. We discuss the importance of highways and the dependence of our economy on them. But we don't carry our analyses and recommendations to the point where no thinking person could fail to recognize the practical necessity of pushing full speed the modernization of our road systems.

"What is lacking? We can compute—as some of our states do—the monetary benefits in saved time, saved distance, accident reductions, etc. These

show the economic justification for highway improvements, and they indicate the soundness of costly improvements for our major traffic arteries. But I think they leave the motorist and the legislator unimpressed.

"What we lack is the ability to put our product—the highway program—on the line so Mr. Motorist can say: 'I'll buy that.' To date we haven't found out how that can be accomplished, although we do have convincing proof that such an approach would find a ready market. Toll facilities provide this proof.

"Where modern highway facilities have been developed and tolls charged for their use as an alternative to use of obsolete streets and highways, Mr. Motorist has demonstrated a willingness to pay. In other words, when he has had a clean-cut opportunity to state his position, he has said 'I'll buy that.'

"We know that toll roads are not conducive to the development of a coordinated highway system. We know that we can provide more service to the motorists at less cost by the construction of free roads. But we are operating government agencies dependent upon public support, and apparently we are unconvincing, to date, in the presentation of our programs. The motorists have demonstrated, through willing payment of tolls, that they are ready to pay for modern highways. But apparently it is not appreciated that we

have an entire system of modern highways to be purchased. Or, more likely, the road users don't like the way we propose to sell it.

"There are several things which handicap us in getting our programs financed:

"First: Diversion and dispersion of funds create an unhealthy atmosphere around road-user taxation.

"Second: The indirect relationship between payment of road-user taxes and the construction of a particular highway is not helpful. Contrasted to this is the direct relationship on toll projects between the tolls and the facility.

"Third: The so-called 'pay-as-you-go' but actually 'pay-before-you-go' financing is unrealistic in relation to much of our modern highway construction, particularly that of an expressway character where access is controlled".

The two major points made by Mr. Jorgensen are, we believe, vital to the entire highway program. First, we need a complete reappraisal of our highway financing methods, taking into proper consideration total highway transportation expenditures. Second, as we have pointed out often before, we must have a sound, honest, effective job of public education and information. We must tell the public the highway facts, and what their share must be in an adequate highway program. CONTRACTORS AND ENGINEERS MONTHLY believes a third factor is equally vital to the solution of the problem. Highway departments must do their jobs well. More and more, the public is pointing out with embarrassing accuracy to highway engineers cases of the job not well done. The day of year-to-year improvements in alignment, curvature, width, and type of pavement is over. Better engineering—the kind whose highways will not become obsolete in a decade—and more efficient administration are needed.

When these three things are included in highway building, we believe with Mr. Jorgensen that the public will say "We'll buy that."

ASCE Spring Meeting

The Spring Meeting of the American Society of Civil Engineers was held during April in Oklahoma City, Okla. Among the subjects discussed there were air transport, construction, highways, irrigation, and other phases of

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civil engineering affecting the midwest. Attendance at the meeting was approximately 800. Members of the Oklahoma Section of the ASCE served as hosts for the guests and their wives throughout the three-day meeting.

A Reader Views Silting, Salaries, and Spalling

To the Editors,

CONTRACTORS AND ENGINEERS MONTHLY

In a previous issue [October, 1948, pg. 78] you had a most interesting article on the dredging of a deeper channel in the St. Johns River near Jacksonville, Florida. As a former Major of engineers during World War I, I am very much interested in the work of the Corps of Engineers. In civilian life I practiced engineering in Florida, and observed that silting regularly caused many streams to overflow their banks. From experience and study I am of the opinion that unless certain precautions are taken to prevent silting of the new channel, it will become full of silt within a few years. The deepening of the St. Johns River channel is an interesting study, and the results of the dredging there may well influence the development of many channels and rivers in the west. I hope you will keep in touch with developments on this river, and publish articles about them from time to time. They will be food for thought to many silting experts in the Mississippi Valley.

While on the subject of engineering and construction, I would like to make a plea for more adequate salaries for highway engineers. Unfortunately, many heads of highway departments are either politicians or engineers with very limited experience. States spending millions of dollars on roads should have in charge of their highway departments engineers with broad training and experience, and with analytical minds. The states should pay such men \$12,000 to \$15,000 a year. In turn, they would save the states millions in the long run.

One of your articles on highway maintenance described the trouble with their roads that several states experience in the spring from freezes and subsequent thawing. [See C. & E. M., July, 1948, pg. 86.] A proper understanding of drainage by highway engineers will prevent the formation of frost blisters which result in pavement break-ups. Something else not fully understood by highway engineers is spalling and curvature occurring in concrete slabs. They, too, may be prevented if the proper precautions are taken. Although I am now 77, these subjects are still as important as they were back in 1908 when I built the first concrete pavement in Cook County, Illinois.

Sincerely yours,
Edgar A. Rossiter
Consulting Engineer
Chicago, Ill.

FIRST CONCRETE GOES INTO WHITNEY DAM



Engineers and contractors look on as the two workmen in the right background swing into position a 4-cubic-yard bucket containing the first concrete to be placed in Whitney Dam on the Brazos River near Waco, Texas. Pictured here from left to right are Assistant Resident Engineer Lee Wilson (wearing glasses); Contractor L. P. Reed (wearing dark helmet); K. M. Smith, Chief of the Construction Division, Galveston District of the Corps of Engineers; Simon Piedmont, General Superintendent for Reed Construction Co.; and Resident Engineer Mark Haima.

C&E Monthly Wins 1948 Safety Award

One of the National Safety Council's Public Interest Awards has been made to **CONTRACTORS AND ENGINEERS MONTHLY** for exceptional service in accident prevention during 1948. These awards, which are inaugurated this year, are non-competitive, and are given in recognition of outstanding efforts of a continuing or exceptional nature by all types of public information media.

Eight trade journals, 8 general-circulation magazines, 36 newspapers, 48 radio stations, one radio network, 5 advertisers, and one film sponsor were honored by the board of judges for exceptional leadership and support of the national safety movement last year.

The judges were Erwin D. Canham, Editor of the *Christian Science Monitor* and President of the American Society of Newspaper Editors; Norman Damon, Vice President of the Automotive Safety Foundation; Wesley I. Nunn, Advertising Manager of Standard Oil Co. (Indiana) and coordinator of the Advertising Council's "Stop Accidents" campaign; Dr. Kenneth E. Olson, Dean of the Medill School of Journalism, Northwestern University; and Arthur C. Stringer, Director of Special Events, National Association of Broadcasters.

Delays Are Expensive On Construction Projects

Delays on construction jobs run as high as 80 per cent of the total working time available, according to studies conducted by the Production Cost Unit of the Public Roads Administration. This fact was obtained from an analysis of field studies made during 1947 and 1948 on 33 typical grading and surfacing jobs in eastern states. It was reported by the Committee on Economics of Highway Construction and Maintenance Methods, Highway Research Board. The summary covered a total of 55 major units of equipment—including dual-drum pavers, asphalt plants, bituminous finishers, scrapers, shovels, and stabilizing machines—for a combined period of 5,394 hours of total working time.

Major delays of 15 minutes or more accounted for an average loss of 45 per cent of the time. Minor delays of less than 15 minutes accounted for an average loss of 16 per cent. The studies showed that major delays do not occur with any particular regularity, and that more than half of the major delays are caused by weather conditions. Other causes of major delays are waiting for auxiliary equipment, equipment breakdowns, and shortages of materials. The minor delays, although short in duration, add up to significant amounts in total. Their causes are varied, but the principal ones are shortages of materials on surfacing jobs, shortages of hauling units on all jobs requiring such units, and equipment repairs.

The majority of major delays are not as costly as minor delays, the PRA reports. Since they often cause the job to shut down over an extended period, they tend to reduce the contractor's payroll and other current expense during the delay. During such delays, however, charges for overhead, demurrage, etc., are incurred. During minor delays, on the other hand, the current expense is at a maximum, since the contractor is working with a full complement of men and equipment.

New Office for Link-Belt

The Link-Belt Co. has moved into a new warehouse and district sales office at N. 1303 Washington St., Spokane 13, Wash. Homer A. Garland is District Sales Manager. Authorized distributors in the Spokane territory are Drumheller Co., Walla Walla; Wells & Wade, Inc., Wenatchee; and Yakima Hardware Co., Yakima.



Riveting gangs of J. H. Pomeroy & Co., Inc., of San Francisco, work on the 1,400-foot-long Fruitvale Avenue overpass at Oakland, Calif.—part of the new East Bay freeway. A Caterpillar diesel D13000 powers the LeBoi 315-cfm compressor (right), 2 riveting guns, 2 air jacks, and 2 air wrenches.



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HI-MILER XTRA-TRED

HI-MILER RIB TREAD



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GOOD YEAR truck tires

Hi-Miler, Xtra-Tred, All-Weather—T.M.'s The Goodyear Tire & Rubber Company



The unique 4-level grade-separation structure shown here in model form will provide for a full interchange of traffic between Arroyo Seco, Harbors and Hollywood Parkways.



Of key importance in the growing Los Angeles freeway system, the \$1,500,000 grade-separation structure (this is a side view in model form) will be completed this year.

Giant Network of Expressways



Arroyo Seco Parkway was the first of the freeways in the Los Angeles metropolitan system to be established and built by the State.



Hollywood Parkway is undoubtedly the most important of the four freeways. This shot shows a completed section at Cahuenga Pass.



Satellite bridges like this one are another part of the vast project designed to relieve Los Angeles traffic snarls and growing pains.

City's "Growing Pains" Cause Traffic Snarls; Road Builders Hurry New Routes to Completion

† MUNICIPAL engineers say that Los Angeles is the most rapidly expanding large city in the United States today. Its growth during the past ten years has resulted in two principal shortages: housing and highways. Some \$305,000,000 in building permits in the last year alone is taking care of the housing shortage. A \$31,209,000 highway construction program for the 1948 working season was the road builder's answer to the traffic problem.

This is no ordinary program of highway construction. It is enormously complex. Fully 55 per cent of the construction funds are being expended for the development of work on four parkways. It involves thousands of problems in right-of-way negotiation, explorations, surveys, design, and administration—even before the construction headaches begin.

It means that new paths for these broad new superhighways must be cut through the heart of a city five times bigger in area than New York City, through residential districts already heavily settled.

The job is by no means near completion. Only a start has been made. The engineers are tackling it the only way they economically can. First the great overpasses, the interchange structures, and so on are being built. Much of that is under way now, as detailed in the companion article. Later, when the structures are finished, grading and paving contracts will be let to tie them together.

Then and only then will traffic to metropolitan Los Angeles and its environs be able to flow swiftly in a steady stream.

Many men will have had a part in the great undertaking. A few will undoubtedly give their lives. But for the present, at least, credit for the undertaking must largely be given to the comprehensive engineering studies which culminated in the passage of the Collier-Burns Highway Act of 1947 in the California State Legislature—one of the far-reaching highway measures of all time.

Much Progress in 18 Months

Eighteen months have elapsed since provisions of the Collier-Burns Highway Act of 1947, covering new procedure and new financing for state highway construction, went into effect. With increased funds available for highway construction, a good start has been made on the freeway system for the Los

(Continued on page 93)



The James I. Barnes Construction Co. is building the upper levels of the octopus-like concrete grade-separation structure. The lowest-level ramps will be built later on.



Column bents support the second level—a 10-span continuous-slab structure—and the third and fourth-level decks of continuous box-girder construction.

Is Under Way in Los Angeles

Organization Is Biggest Problem as Contractor Tackles Concrete Job in Four-Level Interchange

OF all the structures in the metropolitan Los Angeles freeway system, the four-level grade-separation structure near Sunset Boulevard and Figueroa Street, which is the heaviest-traveled intersection in the Los Angeles metropolitan area, occupies the spot of key importance.

A designer's dream, it was the builder's nightmare.

Well, maybe not quite that bad. Construction of the big concrete structure did require extensive organizational study on the part of the key supervisors who ran the job for the James I. Barnes Construction Co., contractor on the \$1,296,000 job.

Superintendent Jim Redpath, who has been building things out of concrete and steel since 1907, explained it this way: "It's always good to get on a job where a man has to use some old-fashioned construction ingenuity. This is such a job."

It really was. Construction could not progress too far on one leg of this octopus-like structure, because if it did, something on another leg would be blocked off. Redpath and his boss, Project Manager R. K. Harris, had to plot their moves with the intricacy of a chess board.

Design of Structure

First of all, let's consider the design of this structure. Speaking generally, the main freeway routes are designed to cross on the second and fourth levels. The left-turn interchange ramps also pass through the structure—two on the first level and two on the third level.

The lowest-level ramps will be built in the future. Rough grading only was done on the J. I. Barnes contract.

The second level, or A deck, consists of a 10-span continuous-slab structure supported on 3-column bents, except that the three central bents are skewed to clear the lowest-level ramps. The slab is 24 inches thick, of reinforced concrete, poured continuously with column caps which are 4 feet wide x 5 feet deep.

The third-level or C and D decks are continuous box-girder construction, tapered from 6 feet deep on the high side to 3.5 feet deep on the low side of the roadway. Decks are supported on single-column bents or on skewed beams resting on ring bearings, where columns pass through more than one level in the central part of the structure.

The top-level B deck consists of two continuous box-girder bridges of 12 spans each. Span lengths are 52.30 feet

By S. V. CORTELYOU,
Assistant State Highway Engineer,
California Division of Highways

and

RAYMOND P. DAY,
Western Editor

and girder depths are 5 feet. These two bridges are supported on 4-column bents, and the decks are tied together by heavy reinforced-concrete beams at the three central bents.

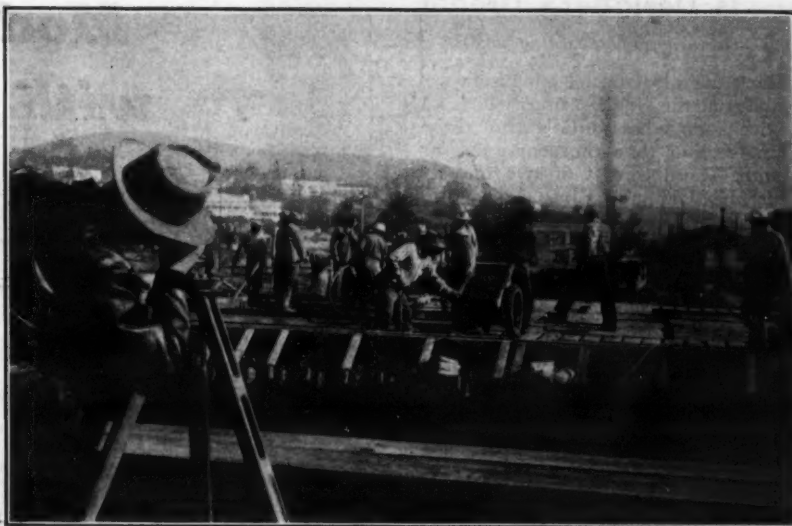
A total of 10 U-shaped abutments and 73 columns or individual hexagonal footings make up the substructure; 477 steel bearing piles provide additional supports in 25 column footings, and 3 abutments. Spacings of the columns are irregular because the various roadways have to be cleared, but in general the structure achieves a high degree of symmetrical beauty.

The structure has some interesting expansion and contraction features. The heavily reinforced concrete geometric center is rigidly connected into a special ribbed footing. The decks radiate out from this point like arms. The ends of all decks rest on steel rockers and bearing plates at the abutments. Roadway surfaces are fitted with steel expansion plates which provide 1½ inches of movement at each end of the deck.

Columns are joined to decks and footings in two ways, depending on the degree of rigidity. For fixed connections, reinforcing-steel dowels are placed around the full circumference of the column. For hinged connections, dowels are crossed in a straight line at the end of the column and premolded expansion-joint filler is placed over the column cross section.

(Continued on next page)

California Division of Highways and C. & E. M. Photos



The day the job was visited, an upper deck pour was in progress. A surveyor was checking on settlement, as concrete hauled by Gar-Bro buggies was placed and vibrated.



Then the deck pour was given a pulled finish by three men of the 24-man crew. Altogether, the structure will contain about 15,000 cubic yards of concrete, all Class A.



This view of upper-level deck pours completed and in progress gives some idea of the complexity of the grade-separation structure, and of the ingenuity which Barnes Co. supervisors had to exercise on the job.



C. & E. M. Photos
Deck concrete for the 4-level grade-separation structure is dumped to a Gar-Bro transfer hopper from an International-mounted Jaeger truck-mixer (above). Concrete materials and the finished concrete were batched on the job under a materials subcontract with the Blue Diamond Materials Corp. In the foreground of the photo at right is part of the carpenter yard for the job, and in the background is a completed satellite bridge which will carry part of the traffic away from the 4-level structure.



4-Level Interchange Is Designer's Dream

(Continued from preceding page)

There are also special expansion assemblies at the ring bearings which let the decks move horizontally around the columns other than the center anchor column. These consist of two milled-steel rings. One is cast into the column capital which is widened for this purpose. The other is cast into the deck. The expansion space is then filled with special soft rubber joint filler, which permits almost an inch of deck movement.

Drainage of water falling on the structure was achieved in the design by carrying the surface water, via roadway gutters, to catch basins joining with a network of storm drains. There are some 2,500 linear feet of storm drains from 15 to 60 inches in diameter, some in trenches up to 35 feet deep: trenches whose sides oozed raw black oil.

The storm drains are also designed to carry the ground-water flow. In many places some of the joints were left slightly open on the under side. Tile interceptors or rock French drains were then led to these openings to carry away any ground water under the structure. That will prevent future ground water from softening the bedded sandstone under the footings.

Construction Surveys

Sometimes a construction job, by the very nature of its intricacy, makes men rise to the occasion and simplify the thing. Such was the case with construction surveys on the job. It is especially noteworthy that a system of surveys was developed by George Leatherwood and Henry Compagnon, State Division of Highways engineers, which let one

(Continued on next page)

Modern Land Clearing with FLECO Products



A "Fleco" Rock Rake mounted on a D8 tractor, owned by Charles Hoffman, Gresham, Wisc., operating on a rockstrewn field that had been unproductive for centuries.

HEAVY-DUTY TOOLS SAVE MONEY IN LAND CLEARING

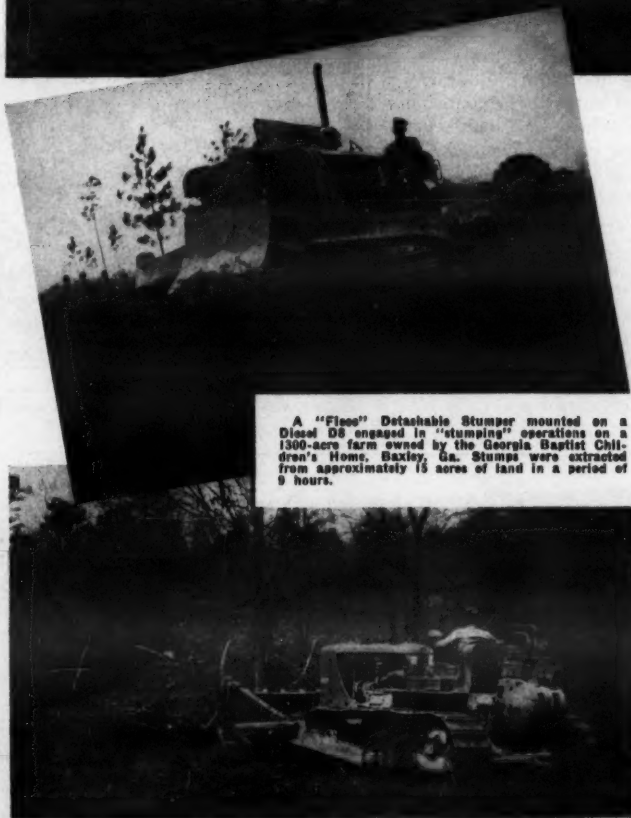
• "Fleco" Rock Rakes have been widely used in clearing land, making rock fills, and in preparing ground for all types of construction. They are also used in removing rocks and boulders for agricultural operations, frequently moving rocks which have been embedded for centuries.

• "Fleco" Detachable Stumper is especially designed for tree-doing and for rooting out stumps. It is easily mounted on the modified bulldozer, and uses the original bulldozer components.

• "Fleco" Root Rake, the third "Fleco" tool for efficient land clearing, is useful for raking and piling heavy underbrush and digging out roots. Both the Root Rake and Rock Rake are interchangeable with the bulldozer moldboard.

• All "Fleco" tools are quality built for heavy-duty service. Hard-surfacing of Detachable Stumper teeth assures maximum wear. Time, money and man-power can be saved by using "Fleco" land-clearing equipment.

• "Fleco" equipment is sold by "Fleco" Caterpillar distributors and dealers all over the world. Write for folder.



A "Fleco" Detachable Stumper mounted on a Diesel D8 engaged in "stumping" operations on a 1300-acre farm owned by the Georgia Baptist Children's Home, Saxley, Ga. Stumps were extracted from approximately 15 acres of land in a period of 9 hours.

Diesel D7 equipped with a "Fleco" Root Rake engaged in land-clearing operations near Gadsden, Alabama. This demonstration of modern land-clearing methods was one of several sponsored by the Extension Service of the Alabama Polytechnic Institute, Auburn, Alabama.

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survey party take care of the whole job. And that party worked only two-thirds of its time on this job, taking care of other work as well.

Deck superelevations a maximum of 10 per cent, maximum downhill grades of 8 per cent, vertical curves, and allowance for camber in the deck spans all complicated the surveying job. Something, therefore, had to be done.

Block surveys of existing streets were made first, closing finer than the usually accepted error of 1 in 10,000. Adjusted traverses were then worked up and a coordinate system established for the whole area. A Record Survey Map with these data included coordinates of all street intersections, angle points, distances along the center line, relative bearings, and the complete plotting of the two major parkways. The intersection of the two parkways was known as the Q-point, or geometric center of the structure.

From this map, a Construction Control Plan was made up. With large-scale profiles, it furnished exact grades at any station. A Bridge Layout Control Plan completed the drawings. This plan permitted horizontal control by coordinate ties. These data were worked up very early in the job, which permitted them to be checked and re-checked for accuracy. Later, when construction boomed, the survey party could take its large-scale drawings and quickly establish any point on the job without extensive surveying and calculation. The Q-point especially was tied down so it could be re-established quickly at any time at any level.

Foundation and Grading

The ground surface at the site, for the top 15 feet, was found to be an alluvial deposit of clays and sandy clays, with high inherent moisture, high expansion, and low bearing value. Underlying this topsoil for a variable depth of from ½ foot to 4 feet was a sandy layer, with free-running ground water.

Beneath this, the material changed quickly to a soft bedded sandstone and siltstone, with thin lenses of shale, known geologically as Miocene shale. These shales contained no ground water, nor did the sandstone. However, this formation lay at the edge of a 35-year-old developed oil field, and the formation was black and high in bitumen content. Oil was found to seep from many places.

Grading and foundation work was difficult in that it was all cramped up in a relatively small space, for dirt work. Near the center of the structure an 18-foot cut was required, while the westerly abutments of Hollywood Parkway required 40-foot-high fills. A 25-foot fill was necessary to build the westerly abutments of the C and D ramps.

About 105,000 cubic yards of earth was handled at the site, and another 80,000 cubic yards was hauled to a waste area in the State-owned Bishop Road borrow pit about 2½ miles away. The excavating fleet which gouged the job out included three Wooldridge Terra Cobras, a Caterpillar D8 pusher, two D8's with 15-cubic-yard Le-Tourneau Carryalls, two sets of Southwest sheepsfoot rollers pulled by a D8, and a 3,000-gallon water tank truck.

A Link-Belt Model 585 shovel was also used with a fleet of 20 war-surplus trucks. This machine loaded out the waste excavation to the trucks, which carried it to the state borrow pit. On the return trip a Northwest 80-D shovel in the borrow pit loaded the trucks with good select fill material and sent them back to the job.

This interchange of material was one of the unusual features of the job. Engineering studies indicated the necessity for strengthening the job-site dirt with alternate layers of soft sandstone from the Bishop Road borrow. The fills were therefore built that way without ex-

ception, using first a 4-inch compacted layer of local material, then a 4-inch layer of better select material.

The settlement of the original ground under the weight of high fills was also checked precisely. At these locations, timber platforms 4 feet square were made up of 2-inch timber, and a ¾-inch iron pipe was extended up from a fixed position on the platform. The pipe was built up as the fill progressed, so levels could be taken. A 5-foot surcharge was placed on top of the high fills to accelerate the settlement. Studies showed some evidence of rebound when the extra weight was removed, and the original ground settled a maximum of 0.45 foot.

The storm drains were laid in ditches excavated by a Northwest 80-D drag-

line. They were laid without particular difficulty, except that oil oozed in on some of the ditches.

Pile Driving

Each foundation footing was considered individually in the field, and when the job was over, 10 and 12-inch steel H-beams a maximum of 55 feet long had been driven under 28 of the footings. It was originally anticipated that the job would require more pile driving than this, so James I. Barnes Co. was in the position of having excess H-beams left over. These came in handy later for falsework, as we shall see.

The foundations which required pile driving were mostly in the west part of the structure, where bearing capacity of the sandstone was such that piles

were necessary.

Pile-driving equipment consisted of a Northwest 80-D pile-driving crane which was a standard crawler-mounted machine, a set of swinging leads, a 10B3 McKiernan-Terry double-acting pile hammer, and an 85-hp locomotive-type steam boiler. Water and fuel were supplied to the boiler by tank wagon on the job.

Since the spread footings called for piles to be battered many ways, Project Manager R. K. Harris designed a swiveled-type head connection between the leads and the boom point of the crane. This permitted easy adjustment of the leads to any desired batter.

Near-by contractors on some of the other structures are using somewhat (Continued on next page)



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Lorain



4-Level Interchange Is Designer's Dream

(Continued from preceding page)

lighter hammers and are having a hard time. The relatively heavy McKiernan-Terry 10B3, with a boiler big enough to keep it running at its rated speed of 115 bpm, slammed the steel piles down to 32 and 40 tons of bearing without difficulty.

"In pile driving, especially, you've got to have equipment heavy enough for the job," explained Harris.

Special Column Footing Forms

To pour the column footings, special footing forms were designed and used with a great deal of success. These forms were made up in five sizes, varying from 12 to 22 feet in diameter. They were made of 2-inch timber and lined with 3/4-inch plywood. One or two forms of each size were made, and some were used as many as 20 times.

Heavy hinges were attached along the upper edges to let the top faces fold back. This permitted the forms to be stripped easily after the sloping faces of the upper concrete had set, and it also made it easy to set the steel reinforcing in place. The footing forms were handled by a Link-Belt Speeder truck crane, which placed them close to survey points. The forms were then moved and held in exact position by four trench jacks.

Steel for the entire job was detailed, cut, bent, and placed in the work by the prime contractor on the job. The reinforcing steel was furnished by Bethlehem's Pacific-coast plant in Los Angeles. Detailing and bending the 3,500,000 pounds of steel on the job worked out very well indeed, according to Project Manager R. K. Harris. "It fit better in the pours, and we were never held up waiting," he said.

Concrete Work

The total job contained about 15,000 cubic yards of structure concrete, all Class A material. For a structure of its size, it was poured in exceedingly large pours. In some cases permission was secured to combine several pours at once, or to make several lifts at one time. There were some 350-cubic-yard pours in the massive work on the lower decks, and many pours of 200 yards and over.

Concrete materials and the finished concrete were batched on the job under a materials subcontract with Blue Diamond Materials Corp. of Los Angeles. This company set up a small 3-compartment manual batch plant and a 500-barrel cement silo on the job. The dry-batched material was weighed out properly, dumped to a fleet of from 9 to 15 Jaeger high-lift truck-mixers, and sent out to the job.

For heavy pours in the base of the structure and the heavy lower decks, the concrete was dumped to 2-yard Gar-Bro concrete buckets and swung out to the pouring point by the same



C. & E. M. Photo

"This won't take a second, gentlemen"—(left to right) Project Manager R. K. Harris, Superintendent Jim Redpath, and Concrete Foreman G. A. Cook, during a deck pour on the 4-level grade-separation structure.

Link-Belt Model 585 machine which had been used for some of the excavation, re-rigged this time as a crane.

For connecting pours and decks, a timber ramp was built up to a Gar-Bro transfer hopper, with two compartments. The truck-mixers then backed up this ramp and discharged their loads direct. Men with Gar-Bro concrete buggies then hauled the material to the point of placement. Electric vibrators were used throughout the work.

For the high, slim columns, the concrete was hoisted to the top of the pour by a Link-Belt Speeder Model 585 crawler crane handling a 1-yard Gar-Bro transfer bucket full of concrete. The material was chuted down to the base of the pour, where one vibrator man assisted in placing and consolidating the concrete. Rapid rates of pouring on the columns made them strip out beautifully dense and smooth, free even of very many air pockets.

On the day when the job was visited, an upper deck pour was in progress.

(Concluded on next page)

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The transfer and buggy system was in use. A crew of 24 men were hard at work trundling the concrete out on the falsework and finishing it off. Double 2 x 4's had been set accurately with a level for screed reference every 10 feet, and tied down to the previous concrete with steel she-bolts every 6 feet. The screeds were solid enough so that men could walk on them, and they were used constantly in rodding the concrete surface with a 10-foot timber hand-rodding device operated by two men. Bridge deck surfaces were generally given a broomed finish.

No story of the concrete would be complete without some details of the interesting form work and falsework. Column forms were all generally circular, with diameters of 3, 4, 4½ feet, and heights of from 5 to 64 feet. Like other forms, they were designed for repeated usage, and when a long form had been used once it could be re-used on a shorter pour by sawing it off.

The column forms were made of 2 x 4 tongue-and-groove strips with timber collars at 4-foot intervals. Collar plates were designed to permit placing or removal of the form in two semicircular halves when necessary, but most of the time the forms were set by lifting them whole and dropping them over the reinforcing steel. A 10-inch steel H-beam was always attached to the forms to prevent any bending damage while they were being handled.

Column forms were centered at the bottom by fitting them against a plywood ring bolted to an accurate position at the time the footing concrete was poured. Centering, elevation of the top, and plumbing of the sides was checked by a survey party. After the form was set and the collars tightened, additional ½ x 2-inch steel bands were fitted and bolted at 1-foot intervals, thus permitting concrete to be poured as fast as 52 feet an hour. This was one of the secrets of the lack of air bubbles in the dense column faces. No further finishing was ever required on the dense, slightly fluted surfaces. In fact, the concrete forms and pours were handled so skillfully and carefully that when the forms were stripped the concrete work was done.

Deck falsework was also somewhat more than adequate. To hold the deck weight, heavy timber piles were driven to 20-30 tons of bearing and braced two ways with 4 x 8-inch timbers fastened to the piles with bolts and toothed ring connectors. Under the very high trestlework, the original piles were sawed off to a level grade and pony bents constructed.

Through the central part, the falsework posts rested on the previously poured lower decks. In these locations, specifications called for the falsework to remain in place on all levels until the top deck was done. This provision might have caused a bad tie-up of a large lumber inventory, but the excess steel H-beams were put in service by adopting longer spans and heavier post loads for the falsework at these places.

Steel H-beams served here as stringers, caps, and uprights. Intermediate caps carrying lighter loads were made of 10 x 10-inch timbers. Deck floor joists were made with 4 x 8's on 6 to 12-inch centers, resting on the steel stringers. In the skewed spans of the A deck, 2 x 4-inch joists at 10-inch centers were used with 4 x 16 timber stringers. All deck soffit and side forms were made from ¾-inch plywood.

Personnel

State Division of Highways headquarters engineering personnel is the same for the four-level structure as listed in the companion article. In addition, for the State Bridge Department, J. W. Green is Southern Representative and H. R. Lendecke is Resident Engineer.

For the J. I. Barnes Construction Co., R. K. Harris is Project Manager, with

Jim Redpath as Superintendent and George Cook as Concrete Foreman.

Self-Propelled Crane Units

A 16-page catalog on Thew-Lorain self-propelled cranes has been put out by The Thew Shovel Co., Lorain, Ohio. It illustrates 48 of the uses to which this type of crane is adapted.

The Thew-Lorain is a self-propelled one-man-operated crane. It has a single-engine power unit and travels at speeds up to 7 mph. Four speed ratios are available in each direction.

Bulletin No. 1451518 lists 9 features claimed for the Thew-Lorains and 15 materials-handling attachments available for use with them. Among the features listed are rubber-tire mobility, finger-tip-controlled full-airpower steering and brakes, location of all controls at the operator's position, and ease of maneuverability and adaptability.

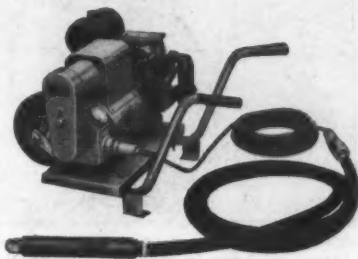
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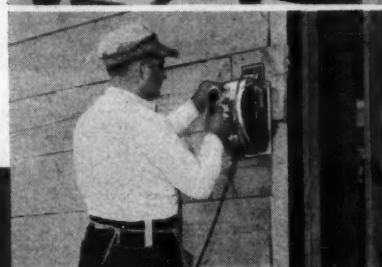
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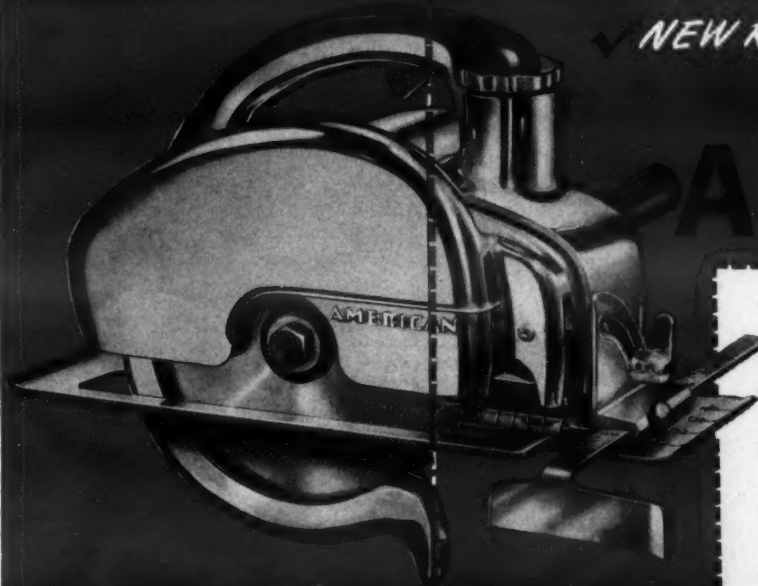
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Earth-Moving Wagon Has 20-Yard Capacity

A 20-cubic-yard wagon is announced by the Wooldridge Mfg. Co., of Sunnyvale, Calif., for use with its 2-wheel tractor units. It is available complete with a 200-hp Terra Cobra Model TC tractor, or as a separate wagon. The wagon is designated the Model W-14; the combination, Model TC-W14.

The Terra Cobra unit features a tapered bottomless hopper which can be used to spot-dump to the rear, or, by moving back on roller tracks, to spread to the desired lift. The hopper will pass rock up to 48 inches in diameter. Positive fore and aft motion of the body is effected by air-controlled cables reeved without reverse bends and in such a manner as never to contact the load. The cable is said to be accessible at all times.

The rear-wheel brakes operate from two air reservoirs on the wagon, and are set automatically if the air supply from the tractor is interrupted. They may be set by hand from the operator's cab. In addition, a disk parking brake is included on the tractor unit. Positive 2-wheel steering and traction are identical with the Terra Cobra scraper. Designed balance, which is said to maintain complete stability even with the hopper in extreme positions, permits dumping over banks and into pockets of back-up, run-around, or run-over types.

Further information may be secured from the company, or by using the Request Card at page 16. Circle No. 100.

Electric-Arc Welders

New ac arc welders are announced by the Welding Division of General Electric, Schenectady 5, N. Y. They feature increased welding range and stepless precision current control, and they are available in 200, 300, 400, and 500-amp models for indoor manual welding; 750 and 1,000-amp models for machine and submerged melt welding; and a special 200-amp model for light-duty job-shop welding. The 300, 400, and 500-amp models are also offered in weather-resistant enclosures with Idlematic control for both indoor and outdoor use.

Dual current ranges and increased adjustment overtravel on the new machines are said to provide an extra-low current range with high maximum short-time output. The welders' stepless current control is operated by a bearing-mounted current-adjustment crank which enables the operator to make precision settings throughout the current range.

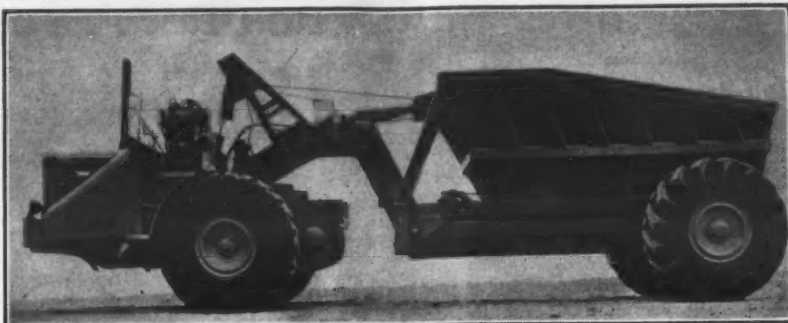
The new welders have an open-circuit voltage of 75. The Idlematic control on the weather-resistant models automatically reduces the open-circuit voltage on the electrode to about 30 volts, says General Electric; but when the arc is struck, the advantage of 75-volt open-circuit voltage is retained.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 70.

Changes Announced by I-H

New executive assignments in the sales staff are announced by the Industrial Power Division of the International Harvester Co. W. M. Holland has been placed in charge of engine sales, succeeding W. M. Parrish who retired. I. P. Payne has been advanced to Assistant Sales Manager in charge of distributors' sales. H. R. Carlson succeeds Payne as manager of the southwest region.

The Motor Truck Division of the company also announces that its former eastern sales region has been divided into two regions—the eastern and the east-central. The eastern region comprises Albany, Boston, New York, Philadelphia, and West Haven; the east-central comprises Baltimore, Buf-



The cable-controlled hopper of the new Terra Cobra Model W-14 wagon rolls back to spread or dump to the rear. It is shown here with the Terra-Cobra Model TC tractor.

falo, Cleveland, Columbus, Harrisburg, Pittsburgh, and Syracuse. J. T. Sullivan continues as Manager of the new eastern region, and L. A. Hanson is named Manager of the east-central region. J. C. Bulleit succeeds Mr. Hanson as Supervisor of motor-truck parts and service merchandising.

J. L. Teach has been appointed Manager of fleet, national, and manufactur-

ers' sales in New York City. C. L. Sears replaces him as District Manager at Columbus, Ohio. B. H. Crawford has been transferred to Pittsburgh as Assistant District Manager, and J. S. Turner has been transferred to Kansas City in the same capacity, succeeding Mr. Crawford. S. V. Erickson has been transferred to Milwaukee as Assistant District Manager. J. C. White has been

appointed Assistant Manager of the Shreveport sales district. W. H. Davis has been appointed Assistant Manager of the Amarillo sales district.

Also announced is the transfer of the Lake County, Ill., sales area from the Milwaukee to the Chicago motor-truck sales district.

Film on Crane Operation

Rubber-tired excavators and cranes are shown in a 16-mm sound-and-color motion picture produced by The Byers Machine Co. Entitled "There's a Difference", the film stresses the operation and features of the Byers Traveler units which are made in ½ and ¾-cubic-yard sizes. It also depicts various job applications for which the units are equipped, including use as shovels, cranes, backhoes, draglines, and clamshells.

Arrangements for viewing the film can be made by contacting any Byers distributor. Or get in touch with The Byers Machine Co. at Ravenna, Ohio.

CHASSIS PARTS



MORE THAN 300 MILLION POUNDS OF TEXACO MARFAK HAVE BEEN SOLD!

Tune in...
TEXACO STAR THEATRE
presents MILTON BERLE
every Wednesday night.
See newspaper for
time and station.



TEXACO

Dowels Are Placed By Mechanical Means

A machine designed to install dowels and tie bars in concrete pavements is announced by the Flex-Plane Co., Warren, Ohio. Usually placed on the forms directly behind the finishing machine, it vibrates the bars through the finished surface to position and alignment within the slab. It thus eliminates all dowel-holding equipment, says the company.

The Flex-Plane mechanical dowel installer has been job-tested for three years and has shown a high degree of accuracy in spotting the bars, the manufacturer points out. Time studies indicate that it installs the dowels and tie bars in about 30 seconds. It has a combined gasoline and electric power unit, and its lift controls are hydraulically operated.

The machine is made in two standard widths. The full-width-paving machine is adjustable from 20 to 25 feet. The half-width machine is adjustable from



Dowels and tie bars are mechanically installed in concrete pavements by this new Flex-Plane rig. Traveling behind the finisher, it vibrates the bars through the finished surface to position and alignment within the slab.

10 to 12½ feet. Attachments include a dowel spotter to install transverse bars, a tie-bar attachment for installing longitudinal bars, and an attachment for installing both transverse and longitudinal joints. The large machine is usually equipped with all three of these attachments; the smaller, with the dowel spotter and transverse-joint at-

tachment only. The manufacturer states that in a 30-second operation, the large machine will install the dowels and tie bars and cut the transverse and longitudinal joints.

Further information on this dowel installer may be secured from the company, or by using the Request Card at page 16. Circle No. 88.

New Tilt-Top Trailer Has a 3-Ton Capacity

A new light-duty tilt-top trailer with a capacity of 3 tons is now available from C. R. Jahn Co., Dept. 47, 1106 W. 35th St., Chicago 3, Ill. Jahn manufactures a complete line of heavy-duty low-bed trailers in a capacity range of 5 to 100 tons. It recommends the new 3-ton unit for handling ditchers, mixers, compressors, and other small equipment.

Its platform height of 14½ inches provides easier and faster loading, says Jahn, and keeps the loading incline at a minimum when the platform is tilted. The platform's balanced design is said to make possible one-man loading without the need for jacks or loading ramp. An automatic safety lock is designed to hold the platform in position when loaded or empty. Other features include a 56 x 132-inch platform, dual wheels, and four 6-ply 6:50 x 20 tires.

The Jahn Model JT-203 tilt trailer can be used with any standard ½-ton truck equipped with a standard pintle hook. Its approximate weight is 1,800 pounds. Standard equipment includes reflectors, safety chains, and lash rings. Electric brakes are optional.

Further information may be secured from the company, or by using the Request Card at page 16. Circle No. 112.

New-Model Grader

A newly designed road maintainer is announced by Contractors Machinery Co., Inc., Clinton St., Batavia, N. Y. The new Trojan Welterweight maintainer is recommended by the company for all routine road-maintenance work. Its weight has been increased 1,000 pounds to 11,500, and its wheelbase has been extended 15 inches.

The operator's compartment is roomier and has been moved forward to provide complete visibility for all operations. The operator's seat has a back rest and is mounted on an adjustable spring-cushioned pedestal. The controls have been centralized for easier operation. Inside height of the cab is 6 feet 3 inches, but overall height of the Trojan Welterweight has been kept under 10 feet.

The new model, PM-10-49, has a greater blade range and its frame and drawbar circle assembly is stronger. The front wheels have been changed to accommodate a demountable-type rim. Leaning front wheels are available as a factory-installed extra. Special attachments for use with the Welterweight include a cab or canopy, scarifier, bulldozer, V-type snow plow, and front-end loader.

Further information may be secured from the company, or by using the Request Card at page 16. Circle No. 110.

Reinforcing Accessories

Reinforcing-bar accessories are described in a catalog available from the Bethlehem Steel Co., Bethlehem, Pa. These include slab bolsters, beam bolsters, continuous high chairs, bar chairs, high chairs designed to carry bars at greater than ordinary heights, and joist chairs. Each of these units is illustrated to show its construction and use. Accompanying each illustration is a list of the unit's specifications.

The final page of Folder 550 contains information on design specifications for the use of these accessories. The material presented has been reprinted from a "Proposed Manual of Standard Practice for Detailing Reinforced Concrete Structures", published in 1946 by the American Concrete Institute. The design details are presented for joist, beam, or girder construction; for one-way slab construction; and for flat-slab construction.

This literature may be obtained from the company, or by using the Request Card at page 16. Circle No. 55.

LAST LONGER

AND maintenance costs come down when you lubricate with long-lasting Texaco Marfak.

Heavy loads won't squeeze Texaco Marfak out of bearings. Rough service won't jar it out. Texaco Marfak seals out dirt and road splash, keeps rust-forming moisture off metal. Bearings get full protection, parts last longer, maintenance costs less.

In wheel bearings, Texaco Marfak Heavy Duty is the stay-on-the-job lubricant to use. It seals itself in, seals out dirt, protects against rust. It won't leak onto brakes . . . requires no seasonal re-packing. Texaco Marfak Heavy Duty will save you many a wheel bearing replacement . . . sharply reduce your maintenance costs.

The line-up of Texaco lubricants for contractors' equipment also includes Texaco Ursa Oil X**, designed to keep Diesel and heavy-duty gasoline engines clean . . . and Texaco Track Roll Lubricant to give rollers extra protection against dirt and moisture.

Use Texaco's Simplified Lubrication Plan to get better, more economical performance from all your equipment. A Texaco Lubrication Engineer will gladly tell you about it. Just call the nearest of the more than 2300 Texaco Wholesale Distributing Plants in the 48 States, or write The Texas Company, 135 East 42nd Street, New York 17, New York.

HIT IT! Marfak won't splatter like ordinary chassis grease—proof that it stays in the bearings under heavy loads and pounding service.



STRETCH IT! Marfak holds together where ordinary grease comes apart—proof that it can't work out of bearings, gives longer-lasting protection.



RUB IT! See how Marfak liquefies under friction while retaining its tough outer "collar"—proof that it seals itself in, seals out dirt and moisture.

Lubricants and Fuels

FOR ALL CONTRACTORS' EQUIPMENT

Major "Workout" At District Shop

**Bad Winter Snow Season
Makes Going Tough at
Headquarters Shop Until
All Equipment Repaired**

OUT at District 4, in the heart of the Texas Panhandle, highway maintenance men have just pulled through a winter which, if milder than Wyoming's, was a rip-tailed twister for Amarillo and the surrounding 18 counties which make up the district.

Men worked 36 hours at a stretch, equipment operated long hours, and except for a few hours when nothing could whip the storm, transcontinental Route 66 remained open. The nerve center for the entire operation was the headquarters repair garage in Amarillo. The continuous performance of much of the equipment depended on the mechanics at this garage and the spare parts they had in stock.

Mechanics who did not leave the shop for long periods during one storm after another now have all major equipment repaired and in operating shape, thanks to a mechanical repair set-up which is geared to meet these emergencies.

The headquarters garage at 403 Bowie Street, Amarillo, is a brick and tin building about 125 x 80 feet. It houses an equipment-repair shop, a stockroom with about \$100,000 worth of parts neatly arranged in numbered bins or piles, a shower room, automotive lubricating room, and grease room. Another building near by contains a well-equipped blacksmith shop and a sign and carpenter shop.

Repairs All Equipment

District 4 headquarters is set up to make major and minor repairs on every one of the 235 pieces of heavy equipment assigned to the use of its foremen. Ordinarily these repairs can be well scheduled, but when a roaring blizzard whips down across the Panhandle it is no respecter of schedules, equipment, or men. That happened last winter several times. The going was so tough one hectic day that nine axles on equipment were broken at one time.

TIP-TOP TRAILERS* LOAD HEAVY EQUIPMENT FASTER • SAFER • EASIER



Save time and money with this remarkable proven trailer. **FASTER** because TIP-TOP provides its own loading ramp. **SAFER** because TIP-TOP eliminates accidents caused by slip-shod blocking, skidding and winching. **EASIER** because equipment is driven on or off under its own power.

NEW 20-TON CAPACITY

In addition to the 7-ton (single axle) and 12-ton (double axle) a new, giant 20-ton, power operated TIP-TOP Trailer will soon be available . . . watch for the announcement.

WRITE FOR FREE DESCRIPTIVE FOLDER

ARTHUR REHBERGER & SON, INC.
320 FERRY ST., NEWARK 5, N. J.

*Reg. U. S. Pat. Office & Patents Pending



C. & E. M. Photo

Nerve center of hectic snow-fighting operations this past winter in District 4, Texas, was this headquarters equipment-repair shop in Amarillo.

The repair shop is designed to permit from six to ten pieces of heavy equipment to be worked on at once, with enough room for the mechanics to move around. In emergencies, of course, no shop seems large enough, but this one comes close to fulfilling its purpose even then.

The nucleus of any good repair shop is its equipment. Scattered over this one are an air compressor, an electric

arc welder, a Queen City grinder, a Champion post drill, a draw-cut saw, a South Bend 16-inch lathe with an 8-foot bed, and complete oxyacetylene welding facilities. Stooddy Tube Borium and Stooddy self-hardening rod were in evidence, to hard-face some of the blades which suffered from abrasion.

A Manley hydraulic press, Sioux valve-reseating and refacing equipment, two Storm line boring bars, and a

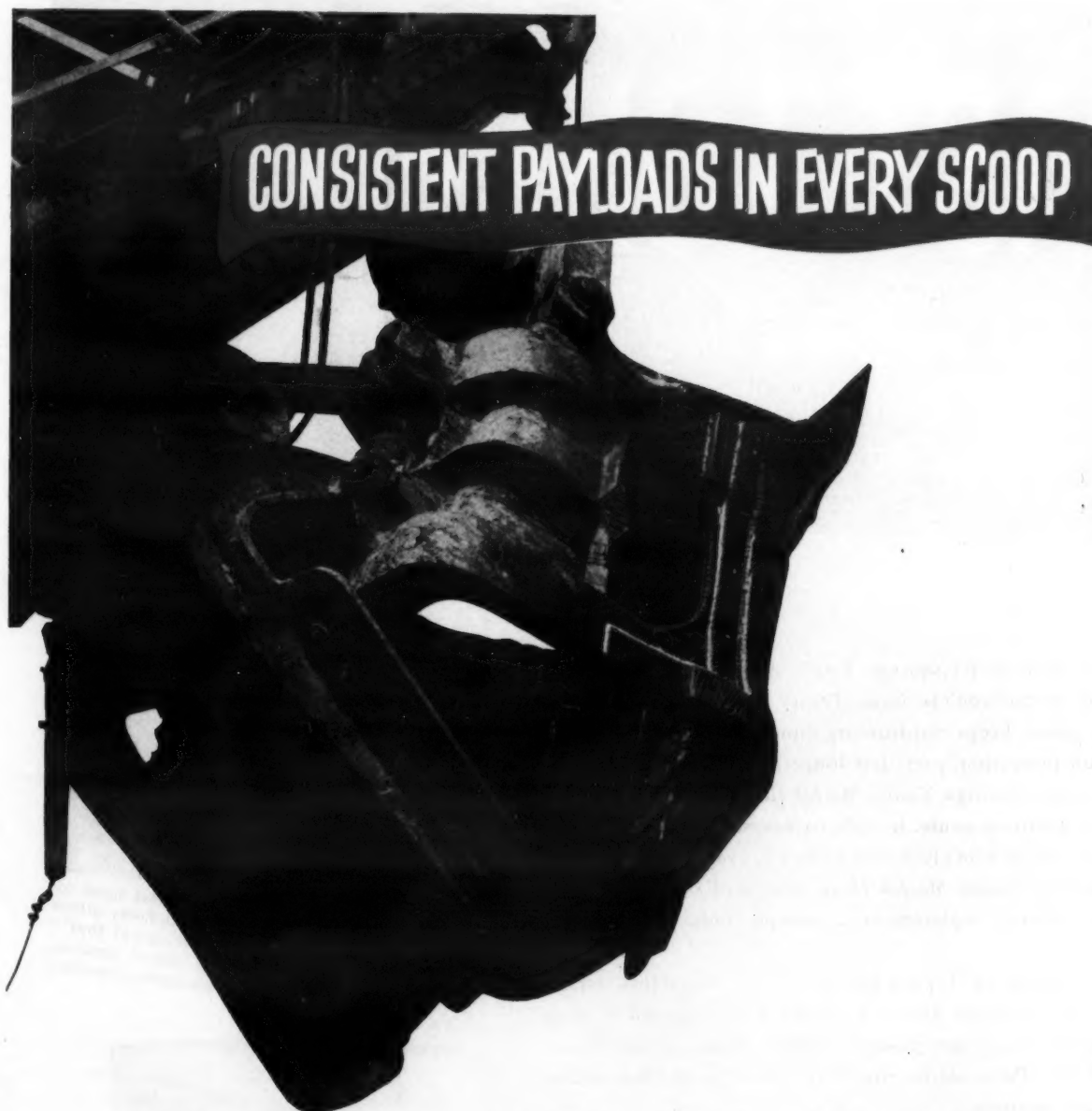
Sunnen grinder complete the picture. Small tools in profusion are all around, a monorail runs the length of the shop with a 5-ton hoist to lift equipment parts, and there is natural-gas heat for those cold winter days and nights.

The blacksmith shop is fully equipped, even to a large power hammer, and the other shops are also fixed to handle the work their specialties demand.

When a piece of equipment breaks down so it requires major repairs, it is hauled in to the headquarters shop on a low-bed trailer. By the time it arrives, an advance inspection has been made and mechanics are scheduled and ready to start tearing the machine down. Repair parts are then quickly brought out, either from stock or from local purchase, and the machine is kept idle for as short a time as possible.

This holds true for practically all repairs, no matter how large or small. On routine repairs involving, say, a new set of rings to the engine of a truck, the mechanics usually wait until the work

(Concluded on next page)



...with less time out for maintenance
when you hard-face with **STOODY SELF-HARDENING 21**



Inside and Out **STOODY SELF-HARDENING 21** slows down destructive wear on shovel buckets. With doubled life, full payloads and freedom from frequent maintenance, your tonnage benefits proportionately—with important cost savings.

STOODY SELF-HARDENING 21 is a new alloy especially designed for protecting heavy equipment. It features exceptional abrasion resistance, with good impact qualities; is faster and easier to apply than any comparable rod. Burns either A.C. or

D.C. without slag interference. With D.C. welders, Bare **STOODY SELF-HARDENING 21** handles as easily as coated electrodes, and is actually preferred by many skilled welders.

Where abrasion is a major factor, **STOODY SELF-HARDENING 21** keeps all wearing equipment in top operating condition with a minimum of time and effort. Try 50 lbs. today!

STOODY COMPANY

1136 WEST SLAUSON AVE., WHITTIER, CALIFORNIA

of that truck or the weather makes the timing especially favorable so far as keeping the truck away from a job is concerned.

The Amarillo shop handles and repairs several types of equipment not generally found in many of the other Texas highway districts. It has two Snogo rotary snow plows, for example, as well as two of the new Roto Wings, which are mounted on Walter Snow Fighter trucks. One of District 4's grizzled old maintenance foremen stated the story succinctly when he said, "Here we either patch holes or fight snow. Sometimes we do both."

The District has about 135 pieces of automotive equipment, 216 pieces of miscellaneous maintenance equipment, 26 tractors, and 6 trailers to keep in repair. Texas operates its equipment until further use is no longer economical; then its Bureau of Equipment, under John B. Nations at Austin, trades the machine in on a newer model. The machines at Amarillo are put there on a rental basis.

By jumping in and repairing equipment whenever the need arises, winter or summer, rain or shine, day or night, the mechanics of District 4 make it possible for this roster of machines to maintain 1,600 miles of highway in the district system.

James G. Lott is District Engineer at Amarillo, J. S. "Bill" Gaines is his Equipment Foreman, and Alva Chambers is Shop Foreman. All Texas Highway Department operations are supervised under the general direction of D. C. Greer, State Highway Engineer.

Power-Transfer Unit

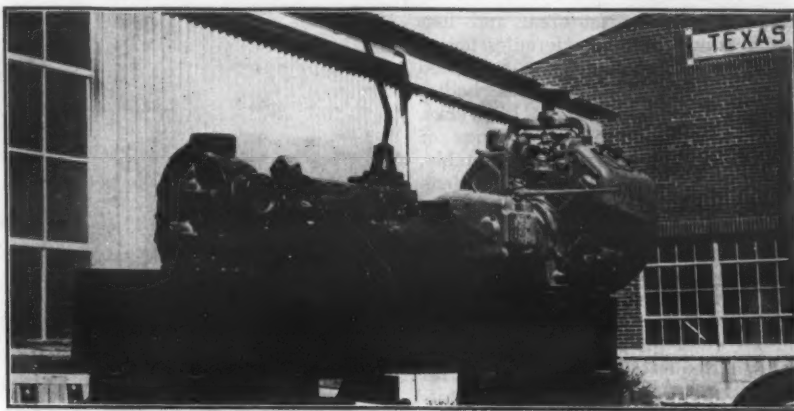
A hydraulic power-transmission unit for small engines or motors is manufactured by the Twin Disc Clutch Co., Hydraulic Division, Rockford, Ill. The Hydro-Sheave is designed for use in a power range of $\frac{3}{4}$ to 25 hp. It consists of a Twin Disc hydraulic coupling and a sleeved shaft which slides directly over the output shaft of any small motor or engine.

Oil is the medium of power transmission in the Hydro-Sheave drive. Incoming power from the electric motor or internal combustion engine rotates the inner member of the hydraulic coupling, and its blades throw a continuous stream of oil against the vanes of the coupling outer member, or housing. The rotation of the housing with its attached sheave or sprocket thus provides a steady flow of power to the driven equipment. Sudden shocks or overloads are absorbed by the fluid, the manufacturer states, and never reach the motor or engine.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 69.

Subgrader Features Listed

Operation and construction features of the Standard-Lewis subgrader are listed in a catalog prepared by the Standard Steel Corp., 5001 S. Boyle Ave., Los Angeles 11, Calif. According to the catalog, the subgrader has set records of 8 cubic yards a minute and 12,000 linear feet of finished 25-foot subgrade in 8 hours. It is designed to complete finished subgrades from side



C. & E. M. Photo

This Roper asphalt pump, hooked through a Chevrolet transmission to a Wisconsin air-cooled engine, was developed by District 4 to meet its needs for a mobile asphalt-pumping unit.

form to side form without handwork or follow-up of any kind.

Bulletin 52-A features a large photograph of the Standard-Lewis subgrader, which is keyed to short de-

scriptive paragraphs about the unit's parts. It illustrates the operating mechanism with a cross-sectional drawing, and it tells how the unit will travel up and over obstructions in the subgrade

and how the traction wheels can be rotated for use in towing the machine to different locations.

Specifications are listed for the 28-hp gasoline-engine power unit, the automotive-type transmission, the hoist, conveyor system, traction wheels, and cutting blade. Also included are the dimensions of the cutting depth, maximum hoist, and cutting width.

This literature may be obtained from the company, or by using the Request Card at page 16. Circle No. 99.

Changes Announced by PCA

Harry E. Frech has retired as District Engineer in the St. Louis office of the Portland Cement Association. Mr. Frech, who was with the PCA for 30 years, is succeeded by Carl J. Chappell. Leo H. Corning is named Manager of the Structural & Railways Bureau, Chicago, to fill the vacancy created by the death of Arthur J. Boase. Mr. Corning has been with the association since 1929.



Barber Greene

more capacity

more speed

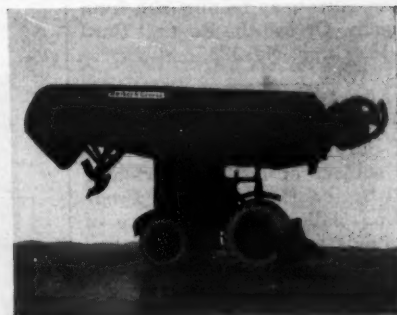
more usefulness

THE 545A BUCKET LOADER

Every feature in the rugged Barber-Greene Model 545A Bucket Loader helps you to get more yards moved per hour, more jobs done per day.

For instance: there are primary and secondary transmissions . . . a separate crowding clutch . . . three forward speeds . . . a quick reverse. The 8-foot synchronized spiral feed keeps the hard-lipped buckets filled to capacity. Double-wheel drive through big, heavy-duty tires means positive traction and extra power. And you'll like the three-point chassis mounting . . . the light-handed steering.

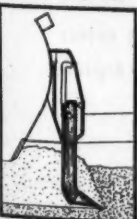
Ask your B-G distributor for the whole story . . . you'll want to put a Model 545A on your payroll.



FAST ON THE ROAD, TOO

It's a great time-saver—fast on the road, fast on the job. Notice how the boom nestles horizontally for transport, and how it reduces overall height. Boom can be tilted onto saddle quickly and easily without using a wrench. Takes only a few minutes to get ready to move.

BACK-RIP SCARIFIER



RIPS in your dead-head time when backing for new load.

BACK-RIPPING Saves Contractors TIME, MONEY and EQUIPMENT.

Hinged teeth assemblies mount on back of Bulldozer moldboards.

SWINGS FREE WHEN DOZING

SMALL EQUIPMENT COMPANY
815 North La Cienega Blvd.
LOS ANGELES 46, CALIFORNIA



BARBER • GREENE COMPANY, AURORA, ILLINOIS

Constant flow Equipment



LOADERS



PERMANENT CONVEYORS



PORTABLE CONVEYORS



COAL MACHINES



BITUMINOUS PLANTS



FINISHERS



DITCHERS



The new ACCO cable-laid grommet, SW-42, gives flexibility comparable to manila rope plus complete freedom from crankiness. It is made entirely of preformed plow-steel wires.

Cable-Laid Grommets

A cable-laid grommet is announced by American Chain & Cable Co., Inc., American Cable Division, Wilkes-Barre, Pa. The SW-42 grommet is equipped with double ACCO-Loc splices. It is made entirely of preformed plow-steel wires, and is designed to give a flexibility comparable to manila rope plus complete freedom from crankiness.

The ACCO cable-laid grommet is furnished in diameters from 9/32 inch to 1 1/2 inches with rated capacities up to 53 tons in basket hitch. It can be used in the same types of hitches as manila rope, the manufacturer states, and the high strength of its all-steel construction permits the use of smaller diameters than would be necessary with fiber ropes. The ACCO grommets have a safety factor of 5 to 1, the company adds.

Further information may be secured from the company, or by using the Request Card at page 16. Circle No. 113.

Earth-Boring Equipment

Earth-boring equipment is described in an 8-page catalog issued by Ka-Mo Tools, Inc., 2121 S. Troy St., Chicago 23, Ill. The Ka-Mo equipment is designed for either horizontal or vertical drilling, and is made in electric or compressed-air-driven models. Its applications are pictured in the catalog.

The catalog also lists 13 features of Ka-Mo tools, the advantages of electrical and compressed-air operation, the component parts of the earth-borers, and the sizes in which these parts are supplied. It also tells how the parts are combined to make the various types of Ka-Mo equipment.

This literature may be obtained from the company. Or use the Request Card at page 16. Circle No. 123.

Hoists and Dump Bodies

Heavy-duty hoists and dump bodies are the subject of a 12-page catalog prepared by the Hercules Steel Products Corp., Galion, Ohio. Feature of the catalog is a 3-page description of the center-lift action of the Speedraulic hoists, in which pictures and text explain how the hoists are designed to push up at the most advantageous point. The catalog also describes the hydraulic pump, the balanced piston valve, and

other Speedraulic features, and lists specifications for three Hercules hoists.

The rest of Catalog No. 48 is devoted to pictures of the Hercules bodies mounted on various types of trucks. These photos indicate the types of work for which each body is suitable, and descriptive text explains the features claimed for each body. Specifications listed for ten models of trailer bodies cover payload, body volume, body size, and the hoist model to use with each.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 54.

Truck-Mixer Chassis

Chassis for truck-mixers are manufactured by the Available Truck Co., 2501 Elston Ave., Chicago 47, Ill. They are made in four models for use with standard-size mixers and agitators. The wheelbase on all models provides for a minimum of 18 inches between the back of the cab and the mixer. This is said



This is the new chassis which Available Truck Co. designed specifically for truck-mixers and agitators. It comes in four models, one for each size of mixer.

to assure easy access to the auxiliary engine on the mixer.

The Available Truck Co. chassis has a cab-over-engine design to provide a minimum turning radius, a correct weight distribution, and better visibility for the driver. Other features include high tractive effort to permit delivery of

concrete to remote forms; heavy-duty construction; ample highway speed to assure a short batch-plant-to-job interval; and availability throughout the country of replacement parts.

Further information may be secured from the company, or by using the Request Card at page 16. Circle No. 105.

WOOD ROADBUILDING EQUIPMENT

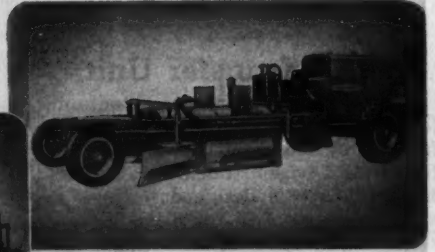
First again in '49



MODEL 42
Self-Propelled



MODEL 54
Tractor-Drawn



MODEL 36
Self-Propelled

- NEW DESIGNS
- MORE ECONOMIES

- INCREASED POWER
- LARGER CAPACITIES

WANT BETTER ROADS AT LOWER COSTS?

These machines produce a thorough complete mix in one pass at the lowest costs per ton. For mixing stabilized bases and wearing courses with any type of binder. Capacities from 100 to 350 tons per hour. Lowest initial cost and lowest upkeep cost, yet they produce the best quantity and quality.

THE PREPARIZER—A HEAVY DUTY PULVERIZER



P-400 with Motor



PT-400 Tractor Powered

These machines pulverize the old asphalt wearing surfaces making it possible to reuse that select aggregate for base material or the new wearing surface. For soil blending work they have no equal.

Write for details

WOOD MANUFACTURING CO.

6900 Tujunga Avenue

P. O. Box 620

North Hollywood, Calif.

ROSCO ROAD OIL DISTRIBUTORS

STREET FLUSHERS and
CLEANERS - MAINTAINERS
ROSCO MFG. CO., 3124 SHELING AVENUE
MINNEAPOLIS 6, MINN.

Please send me your pocket-size pamphlet that pictures
and describes your entire line of equipment.

NAME _____

BUSINESS _____

ADDRESS _____

ALSO send me complete data on:

PASTE THIS TO A PENNY CARD AND MAIL

FIRST CLASS
Permit No. 280
(Sec. 510, P.L. & R.)
New York, N. Y.

BUSINESS REPLY CARD

No Postage Stamp Necessary if Mailed in the United States

2c-POSTAGE WILL BE PAID BY

Contractors and Engineers Monthly

470 FOURTH AVENUE

NEW YORK 16, NEW YORK

FIRST CLASS
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New York, N. Y.

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Contractors and Engineers Monthly

470 FOURTH AVENUE

NEW YORK 16, NEW YORK

Contractors and Engineers Monthly - Request Card - May '49

Please send me further information on the new products and also copies of catalogs described in this issue, as circled below.

1	2	3	4	5	6	7	8	9	10	71	72	73	74	75	76	77	78	79	80
11	12	13	14	15	16	17	18	19	20	81	82	83	84	85	86	87	88	89	90
21	22	23	24	25	26	27	28	29	30	91	92	93	94	95	96	97	98	99	100
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41	42	43	44	45	46	47	48	49	50	108	109	110	111	112	113	114			
51	52	53	54	55	56	57	58	59	60	115	116	117	118	119	120	121			
61	62	63	64	65	66	67	68	69	70	122	123	124	125	126	127	128			

I would also like manufacturer's literature on: _____

Name _____ Title _____

Company _____

Address _____

City _____ Zone _____ State _____

Contractors and Engineers Monthly - Request Card - May '49

Please send me further information on the new products and also copies of catalogs described in this issue, as circled below.

1	2	3	4	5	6	7	8	9	10	71	72	73	74	75	76	77	78	79	80
11	12	13	14	15	16	17	18	19	20	81	82	83	84	85	86	87	88	89	90
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41	42	43	44	45	46	47	48	49	50	108	109	110	111	112	113	114			
51	52	53	54	55	56	57	58	59	60	115	116	117	118	119	120	121			
61	62	63	64	65	66	67	68	69	70	122	123	124	125	126	127	128			

I would also like manufacturer's literature on: _____

Name _____ Title _____

Company _____

Address _____

City _____ Zone _____ State _____



"Guide, hell! I need a surveyor!"
"Surveyor, hell! You need a guide!"

Spring Tune-Up Tips For Tractor Owners

It's a wise tractor owner who gives his equipment a thorough spring tune-up before the construction season gets into full swing. Following are some tune-up tips which have been issued by the Tractor Division of the Allis-Chalmers Mfg. Co.:

Debris in the radiator core is a primary cause of high operating temperature, says Allis-Chalmers, and a tractor can't operate with a fever any better than you can. First straighten the fins and flush the cooling system. Check for leaks and flabby hose. If the thermostat isn't working it should be replaced, because chills are just as bad for a tractor as a high fever.

Minor breakdowns are as irksome as a sore thumb, so check the fan blades and straighten them if they are bent. Check the fan bearings. Put on new belts if necessary, or at least adjust them. Now look down at the engine mountings—they should be sound and securely fastened. A tractor can't work well with sloppy mountings any more than the boss can in a wobble-jawed swivel chair.

When a fella gets a cold, his nose swells up, he breathes through his mouth and gets a belly-ache—and so it often is with a diesel. Check the air cleaner and pipes for leaks. Your tractor will run much better and longer on clean air.

Fuel and oil pumps are somewhat like a man's heart—when they quit, so does the tractor. Check the gages. Low oil pressure may indicate a faulty gage, or, on the other hand, it may indicate the need for a complete engine overhaul.

When you reach the engine, get the outside just as clean as the inside. An oily dirt covering becomes very effective insulation and makes engine cooling difficult. Tighten up oil and fuel lines, inspect seals, conduct a power check, and observe oil consumption which may also indicate that an overhaul job is necessary. If it's a 2-cycle diesel engine, it will pay to clean the air box and port holes in the cylinder liners. You can look for broken rings and scored pistons through the port holes.

Stiff joints in steering clutches, engine clutch, and brake linkage should not be tolerated. Take apart the linkage and get new pins if the old ones are worn. At least clean off the rust and oil the joints. By curing the tractor's rheumatism you eliminate one cause of your own stiff shoulders. It's likely that the engine clutch, steering clutches, and brakes need adjustment. While you have the linkages apart, adjust them and make a note to keep them adjusted through the entire season. Now give the tractor a complete transfusion with summer grades of oil in the engine, transmission, and final drives for that lasting vitality.

Old Man Winter really socks it to batteries. Many give up entirely or are too weak to do much good after fighting sub-zero blasts. So clean up the bat-

teries, recharge them if possible, and then tidy up the terminals, clamps, and wiring harness; check the light switch, starter, generator, and ammeter if you expect your equipment to pay off.

The tracks will need checking also. Maybe the grousers are worn and can't hold, or perhaps the shoes aren't bolted tight to the rails. Loose shoes are as uncomfortable for a tractor as for GI Joe on a 19-mile hike. Pins and bushings with excessive wear should be turned or replaced. Or perhaps a complete new set of tracks should be ordered for the coming season's work. The truck wheels and support rollers should be checked for free play, and repaired if necessary. Then check the adjustment of the tracks and operation of the track release mechanism.

After your equipment is all tuned up, haul yourself down to the family doctor and get yourself tuned up to meet the same strenuous life you've just prepared the tractor for. This preventive maintenance will pay off in the coming season.

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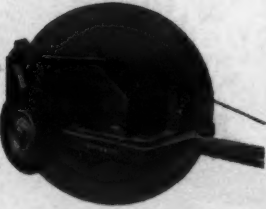
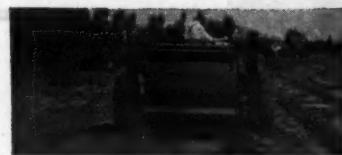
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CONSTRUCTION MACHINERY DIVISION

Southwest Welding & Manufacturing Co.

ALHAMBRA CALIFORNIA



Airport Improvement Starts With Grading

Turf Field Worked Over To Lengthen Runways for Class III County Airport Near Marion, Illinois

† WILLIAMSON County in southern Illinois will be represented some time this year with a Class III feeder-line airport. Known as Williamson County Airport, the new field replaces old Macarin Airport at the same location. It is about 6¼ miles northwest of Marion, the county seat, and 4 miles southeast of Herrin. Both towns have populations of around 10,000.

The original airport was privately owned, but two years ago it was purchased by the Williamson County Airport Authority. The acquired property totals 363 acres, and included four turf runways with the following lengths: 3,500, 3,300, 3,000, and 2,600 feet. The runways were distinguished from the rest of the rolling airport acreage because the grass on them was clipped a little shorter than the rest of the field, and also because they were fairly level. They were also marked out with inverted bushel baskets, painted white and nailed to stakes driven into the ground. The runways fanned out from a 100-foot-diameter gravel circle at the center of the field.

Now, with the cooperation of the Federal Civil Aeronautics Administration, the State of Illinois Department of Aeronautics, and the Williamson County Airport Authority, a contract has been completed for grading and draining the field, including three runways and a parking apron. This contract, which did not include paving, was awarded to the J. D. Barter Construction Co. of Harrisburg, Ill., on its low bid of \$297,153.55. Work started on the project in June, 1948, and was completed by the end of the year. The paving will be done under a separate contract during the 1949 construction season. Consulting Engineers Foth, Porath & Horner of Green Bay, Wis., prepared the plans and did the design work.

New Field

The new airport layout consists of three runways connected at their extremities to form a triangle. Their directions are northeast-southwest, northwest-southeast, and east-west. They are graded 3,800 feet long and 500 feet wide, and will carry a paving strip 150 feet wide. South of the east-west runway is an apron 1,850 feet long x 200 feet wide, and from it extend taxiways to connect with the runways. At the center the airport has an elevation of 472.

Grading the field involved 660,000 cubic yards of unclassified excavation which consisted chiefly of removing the high spots and filling the hollows over this rolling country. The deepest cut was 12 feet, with the average around 5 feet, while the fills varied from 3 to 8 feet in height. The material was predominantly clay.

The field is drained off to open ditches at the southeast, southwest, and northwest corners. Drainage items included 8 manholes, 26 drop inlets, and 11,400 linear feet of concrete storm sewer from 10 to 48 inches in diameter. Trenches for the pipe were dug by a TL 20 Thew-Lorain ½-yard Backdigger, while a Thew-Lorain 40 crane with a 40-foot boom set the larger-size pipe which was supplied by the Egyptian Concrete Co. It was delivered to the job in trucks from the plants at Metropolis, Ill., and Salem, Ill.

Dirt-Moving

Most of the earth-moving was handled

by rubber-tired hauling equipment; included were 3 LaPlant-Choate motor scrapers with 15-yard struck and 18-yard heaped capacities, and a 9 to 11-yard Caterpillar scraper pulled by a DW10 rubber-tired tractor. These units were assisted in loading by an International TD-24 and a D7 push tractor, and they hauled from 1,500 to 1,800 feet on the average. The round-trip haul time was from 4¾ to 7 minutes. For shorter hauls up to 800 feet, from 3 to 5 crawler-tractor and scraper units were employed. They also served to build up the haul roads and keep them in shape. The latter units consisted of both International TD-18 tractors with Bucyrus-Erie scrapers, and D7 tractors with either LeTourneau or Caterpillar scrapers.



C. & E. M. Photo
A Caterpillar No. 10 scraper pulled by a DW10 dumps on a fill during the J. D. Barter Construction Co.'s Williamson County airport-grading contract.

The material was spread on the fills in lifts not exceeding 9 inches and leveled further with a D7 dozer which pulled along behind it a pair of LaPlant-Choate sheepsfoot rollers working abreast. These rollers, together with the weight of the heavy earth-moving equipment, insured a compaction of 90 per cent Proctor on the fill lifts. This

figure was increased to 95 per cent Proctor by additional passes of the roller over the 150-foot-wide strip to be paved on the runways. As the compaction density was to be achieved at optimum moisture, a 1,200-gallon water tank was mounted on an International truck to supply the fills with the necessary water.

(Concluded on next page)

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with **DC-6 CONTROL**
DIRECT CAB



CAPACITY
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CUBIC YDS.

FOR SEAL-COATING . . . ICE AND SLEET CONTROL

WIDTH OF SPREAD:

FROM 12 TO 28 FT. FOR SEAL-COATING.
FROM 12 TO 60 FT. FOR ICE AND SLEET CONTROL.

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Ignition, Starter, Flasher Lights, Clutch, Choke, and Throttle are fingertip controlled from the truck cab. Fits any truck.

UMBRELLA SPREAD - - - - -

Material is confined to a low horizontal plane thereby protecting traffic.

STEEL BELT CONVEYOR - - - - -

The controlled intermittent action shakes materials down through the wide throat onto the twin spinner discs.

WATERPROOF, AIR-COOLED MOTOR - - - - -

A powerful unit capable of driving the twin spinners at a speed of 2400 r.p.m.'s.

SPREADS ANY MATERIAL:
**SAND
GRAVEL
LIME
SALT
CINDERS
CALCIUM-CHLORIDE**
ANY OTHER DESIRED

Contact your Good Roads Dealer or factory for further detailed information or a demonstration

GOOD ROADS MACHINERY CORP. - - - - - MINERVA, OHIO



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A utility machine with merit, power, speed and economy. Increases output of your compressor. Cuts concrete and tamps backfill at a rapid pace. Cuts cost to a minimum. Entirely air powered. Cuts concrete the easy way.

Write for information to Department "C"

R. P. B. CORPORATION 2751 East 11th Street
Los Angeles, California



C. & E. M. Photos

The LaPlant-Choate scraper at left starts to dump its 18-yard heaped load on a fill at Williamson County Airport. The dirt is spread in 8-inch lifts by the D7 with dozer, above, and compacted by the sheepsfoot rollers which the D7 pulls along behind it.

sary water. But the material coming out of the clay cuts was wet enough, and water had to be added only to the haul roads to lay the dust.

With this earth-moving equipment, and a force of from 40 to 50 men, the contractor averaged 7,000 yards of material a day by working two 8-hour shifts. As the bulk of the dirt was moved during the long summer days, artificial lighting was required for only about 1½ hours at the end of the second or late-afternoon shift. A large Kohler 15-kw electric light plant was set up on the fill being made, and a couple of smaller Kohler plants were used in the cut sections where the equipment was getting loaded.

During each shift the machines were serviced right on the job from an Alemite greasing rig mounted on a trailer. Diesel fuel was delivered to the job by the Shell Oil Co. out of Marion, Ill., and stored in two 1,000-gallon tanks from which it was pumped directly to the tractors, motor scrapers, etc. With these periodic inspections and accompanying oil changes, lubrications, etc., the equipment gave day-in-day-out service with no breakdowns for major repairs.

Quantities and Personnel

The major items in this initial grading and drainage contract were three, in number:

Unclassified excavation	660,000 cu. yds.
Storm sewer—10 to 48-inch diameter	11,400 lin. ft.
Seeding	250 acres

The work of the J. D. Barter Construction Co. was supervised by H. H. (Sam) Barter, Superintendent. For the State of Illinois, Department of Aeronautics, which is headed by Director Robert Dewey, W. R. Cooke was Project Engineer. Norman C. Bird is Chief Engineer of the state agency. John J. Hogan is District Airport Engineer of the Civil Aeronautics Administration.

A tentative allocation of Federal funds is available to the Williamson County Airport Authority in the amount of \$150,000 to continue the second-stage development for the paving of the runways at this airport. The sum will be matched in an equal amount by the local Authority and the State Department of Aeronautics.

Trucks With Tandem Drive

Tandem-drive trucks are the subject of a folder issued by Reo Motors, Inc., Lansing 20, Mich. Among the features of the Reo trucks emphasized in this catalog are reliability, durability, and ease of handling. Described in detail are the Reo double-reduction drives which are arranged to provide a through-drive tandem-axle unit, and the load-carrying members of the torque-reaction system.

Illustrations show the Model 316 cab, the 202-hp gasoline-engine power unit, the malleable-iron axle housing, and the Model 316 frame. Specifications cover dimensions and weights, engine, electrical equipment, clutch and transmissions, torque divider, axles, steering gear, brakes, wheels, and standard equipment.

This literature may be obtained from the company, or use the Request Card at page 16. Circle No. 120.

Light-Duty Cleaner

A light-duty parts and equipment cleaner, incorporating new design features, is announced by the Malsbary Mfg. Co., Dept. A, 845 92nd Ave., Oakland 3, Calif. The Model 110 cleaner is a small, compact, portable unit which provides four types of cleaning action: steam or superheated water, with or

without cleaning compound. All operations are regulated by a set of three controls.

The Malsbary cleaner is electrically powered, and is said to generate full working pressure from a cold start in from 2 to 5 minutes. The liquid is heated

by a semi-automatic oil burner using a flash-type coil construction. The cleaner is equipped with a dual-purpose diaphragm pump.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 128.

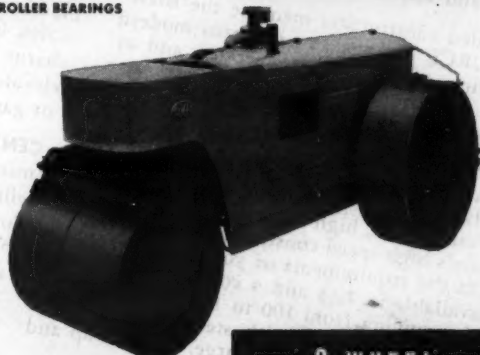


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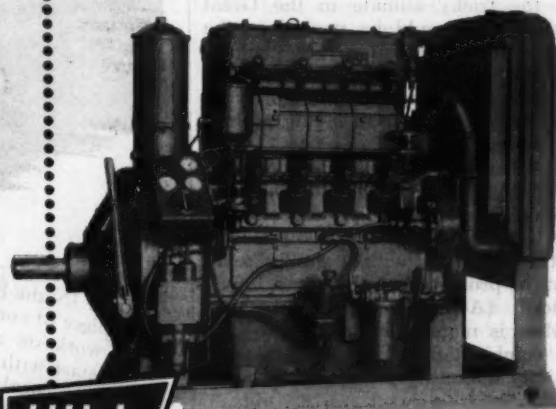
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DIVISION OF

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20 East 50th Street, New York 22, N. Y.

"Weather Management" Raises Contract Profits

(Continued from page 1)

of unpredictable weather conditions, with special emphasis on the unusually severe winter of 1948-49, the writer has just completed a preliminary study of contract jobs and their relation to the weather. Some interesting possibilities have suggested themselves.

For example, if a weather service can tell a cattleman in New Mexico exactly what kind of ground moisture, weather, and range conditions to expect a year in advance, why could the same service not give a New Mexico highway-grading contractor exactly the same information?

If sunshine and ideal photographic conditions can be predicted with amazing accuracy for a fashion photographer on location along the seashore, why couldn't a contractor get practically the same information to govern the timing of his concrete pours?

If a long-range weather prediction could warn a California citrus grower well in advance to sell out, or to lease his vast holdings—which it did—why could not the same information about meteorological conditions that winter for the same area save a contractor just as much money? Knowing the conditions he might not wish to bid on that bridge job he had planned to work on through the winter.

If the tricky climate in the Great Lakes region could be pegged to the profit of a farming co-op, why couldn't the same information on air moisture, humidity, and temperature be used by a building contractor in laying asphalt tile or plastering?

If a manufacturer of a home remedy for prickly heat can be told almost to the day when to get his product stocked on drugstore shelves in Mississippi, why can't a contractor with a similar temperature problem get the same information? (Actually the prickly-heat problem is more than temperature; it is a combination of temperature and humidity operating jointly at the right time.)

Carry it a step further. If a movie producer, on location, can save overtime pay under his union agreement by cutting production at 4 p. m. on the day before, thus not having to pay time for a non-productive appearance of extras on a rainy morning, why can't a contractor with the same pin-point weather service save the same money?

The answer is, "Why not, indeed?"

The service is available, and some contractors are now beginning to use it to their advantage. The incident about the dam is fictional only insofar as names are concerned. It really happened.

Contractors and Weather Service

Last year a contractor in Iowa used specialized weather service with remarkable results. To start with, the job was tricky. It called for grading in a soil highly vulnerable to rainfall. Later on, flexible base and paving had to be placed on the same soil.

The contractor first got a long-range prediction, and found out that the weather was destined to be generally more favorable, so far as moisture was concerned, than it had been for some time. Armed with this information, he felt justified in bidding the job, and in sharpening his pencil to make a low bid. He got the contract.

He then faced such doubtful issues as these: when would the ground be best for grading, when would conditions be best for the placing of sub-base, and when would the job get a protracted dry spell especially suitable for the production of the asphalt road-mixed surfacing?

The answers were furnished by special weather studies. The job was finished ahead of time, and at a neat

profit.

Weather analyses can improve the management of a construction job beyond all imagination. All sorts of common, everyday problems yield if the superintendent knows in advance exactly what to expect from weather. He can reduce the amount of his overtime, he can plan tricky phases of the job to the best advantage, and by using special pin-point analyses he can often help himself out of bad situations.

In this weather-study business there are always two viewpoints: the contractor's, and the weather man's. Suppose the contractor, considering only his own viewpoint, called up a weather service and said, "Give me a forecast for the next 15 days."

The weather service could give him

what he asked for, but if the contractor were sensible and cooperative enough, the weather service could and would give him vastly more for his money.

"Give me a forecast," said one contractor. It took a lot of digging to get any further information from him. What was never disclosed to the weather-service scientist was the fact that this contractor was really worried about a rainfall of not more than $\frac{1}{4}$ inch. Busy on an airport, he was working on top of a tricky soil highly vulnerable to light rain. Moreover, he was trying to finish up his flexible-base work and, if possible, some asphaltic-concrete paving. All this before winter rains did damage.

But he did not tell the scientist these

specific problems. All he asked for was a "forecast for January, February, and March."

These weather boys are individualistic professional people. They have one of the most rigid professional codes of ethics of any group. Information a contractor gives them about his special work and problems is treated with the utmost confidence. To get the most out of the service, a contractor should not hesitate to tell about his particular problem in every detail, and to give any information he may have as to its solution.

One weather service, with contracting clients numbering 115 scattered all over the nation, now makes up a special contractor's weather map, giving weather

(Concluded on next page)

THE BLAW-KNOX COMPLETE PACKAGE

for low cost concrete construction

IN the Blaw-Knox complete package, there's every piece of construction equipment you need to put your work on a cost-cutting assembly line basis. Profits start with Blaw-Knox Clamshell Buckets, increase as the work flows steadily step by step to the other Blaw-Knox machines . . . each one engineered to speed production and lower costs.

Economy-minded construction men use the Blaw-Knox ONE SOURCE package . . . it means modern design, time-saving repair and parts service, and assures a unified production set-up that operates at a profit on every job. Your Blaw-Knox distributor will give you complete details.

PORTABLE AGGREGATE BATCHING PLANTS — You get accurately batched aggregates faster and at lower cost with these flexible, high capacity units, developed to meet today's high speed construction demands. Designed to fit the requirements of your particular job, they are available in 2, 3 and 4 compartment styles, in capacities ranging from 100 to 120 tons. All-steel, self-cleaning storage bins with steep hopper slopes insure rapid and complete discharge. Easy set-up and

take-down saves time, cuts haul costs. Beam scales or dial scales are optional.

PORTABLE BULK CEMENT PLANTS — Cut your costs of handling large volumes of cement. 200 and 400 barrel sizes are furnished, with combination arrangements which double these capacities and still retain complete portability. Speedy erection and relocation eliminates lost time between jobs. Plant includes portable bin, cement weighing batcher of required size with scales, filling and discharge gates, dust cover and discharge chute; also, 50 t.p.h. enclosed type cement elevator with screw feeder and either electric motor or gas engine drive.

CENTRAL MIXING PLANTS — Concrete, batched and mixed in one plant, assures accurate, uniform batches, eliminates waste, speeds construction and keeps costs low. These high production units offered in compartment styles with 2, 3, 4, or 5 compartments, and capacities to meet your job requirements. Weighing batcher discharges into stationary mixer or through dry batch chute into truck mixers.



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BLAW-KNOX DIVISION OF Blaw-Knox Company,
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The Foote Co., Inc.,
Subsidiary of Blaw-Knox Co.,
Nunda, N. Y.

conditions for concrete, excavation, and all the other important phases of construction work. The head of this organization explained, "The more these contractors will tell us about their problem, the more we can tell them about the solution."

In the brief study which lead to the preparation of this article, the writer found a growing belief that contractors, possibly as much as any other group, could profit immensely either by using an independent weather service, or by hiring a meteorologist under sponsorship of such a service to make weather studies. Naturally, the chances of finding a scientist really trained to analyze weather for contractors would be better in the highly specialized weather services.

One skilled weather analyst encountered in the research for this article turned out to be a young man under 30, with more degrees than a thermometer. As a very young boy this lad had become interested in meteorology on his father's farm in Montana. When his father became resigned to the fact that his son's interests lay in a scientific field far removed from agriculture, he did what many contractors could now do with their sons.

"Son, go on to college. Find out all you can about meteorology," he said. "When you get good, maybe you can give me some help."

That man has been out of college only a few years, and according to his father, he has justified the investment in six years of college four times over,

simply by analyzing weather data and relaying it to Montana to his father, who uses the predictions to improve his agricultural yields immensely.

That same boy, and others like him, can also help contractors to an amazing degree.

How Accurate Are Weather Men?

Over the years, experts in the U. S. Weather Bureau have gathered marvelous records. Trained experts can analyze those records with their eye on a special contractor's problem. Once in a while, when weather conditions are strictly marginal or "on the ragged edge," as they say, the experts make mistakes. When paid experts make a mistake for a client, however, they move heaven and earth and spend vast

sums of money to find the cause of the mistake, and to make sure it doesn't happen again.

How accurate can they get? Pinpoint research, if carried to the ultimate, can be uncanny.

Not long ago, a movie director had 15 more minutes to shoot to finish a picture. His weather prediction was for rain at noon. He was trying desperately to finish, because the whole set, equipment and all, was tied up. About 10:30 a. m. the clouds drifted in and obscured the sun.

Frantically he called his weather-service experts. "What shall I do?" he asked. "I've just got 15 more minutes."

Scanning his data, the meteorologist said, "Take it easy. The rain won't start until noon. According to my calculations, the sun will come out at 11:25 long enough for you to finish."

The sun came out at 11:23 a. m.

With that kind of service, the sun can come out for contractors, too, it seems to us, and dry up some of the needless costs which plague national construction and engineering work today.

In line with the ethics which govern contemporary weather-service licenses, the author has refrained deliberately from mentioning specific names. Interested contractors or engineers may secure additional information as to the name and location of a good, reputable, private weather service by addressing their requests to CONTRACTORS AND ENGINEERS MONTHLY, 470 Fourth Ave., New York 16, N. Y.

Diesel Engine Unit Is Rated at 550 Hp

A high-speed diesel engine unit in two models is announced by Cummins Engine Co., Inc., Columbus, Ind. The Model NVHS-1200 is a supercharged engine rated at 550 hp at 2,100 rpm. The Model NVH-1200 is a naturally aspirated engine rated at 400 hp at 2,100 rpm. According to Cummins, the NVHS-1200 is the most powerful high-speed engine now in production. The addition of the NVH increases the Cummins line to 46 different models in a range of sizes from 58 to 550 hp.

These engines are of the 4-cycle 12-cylinder 40-degree V-type. They have a 5½ x 6-inch bore and stroke, and a piston displacement of 1,486 cubic inches. They feature the Cummins Model DD double-disk fuel pump. The engines measure 73 x 41 x 57 inches. The NVHS has a net weight, with standard accessories, of 4,550 pounds; the NVH, 4,300 pounds.

Further information may be secured from the company, or by using the Request Card at page 16. Circle No. 117.

Air, Hydraulic Cylinders

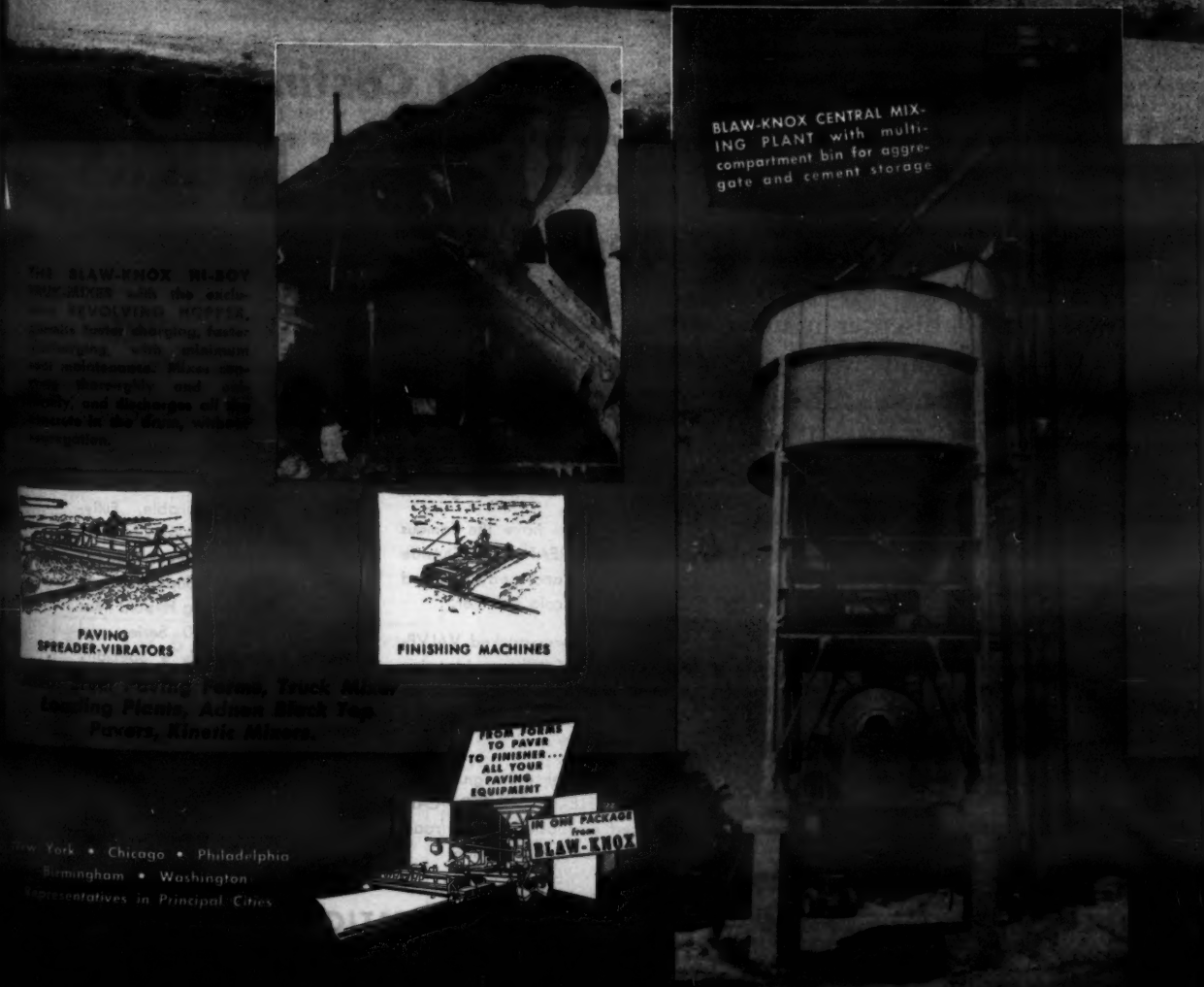
Air and low-pressure hydraulic cylinders are discussed in two catalogs issued by the Hydro-Line Mfg. Co., 711 Nineteenth St., Rockford, Ill. These cylinders are available in several sizes and with several types of mountings. The bores range from 1½ to 14 inches.

Each catalog lists construction features of Hydro-Line cylinders in general. It also contains six drawings showing six standard cylinders and indicating the types of mounting and rod clevis available for each. Tables of dimensions for each cylinder model are accompanied by engineering drawings which show where each dimension is measured and indicate the general construction of each cylinder.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. For Catalog A-48 on air cylinders, circle No. 58; for Catalog H-48-LP on hydraulic cylinders, circle No. 59.

Paul Lundquist Joins PMCO

Paul E. Lundquist is named Sales Manager of the newly formed Construction Equipment Division of the Pettibone Mulliken Corp. He will help direct the corporation's sales policies and advertising, and the expansion of its line of construction equipment.





Traffic Maintained On Road-Widening Job

A road-widening operation in which at least one lane of traffic was maintained throughout the job has been completed on U. S. 30-S, 6 miles west of Mansfield, Ohio. The job consisted of adding a 2-foot width to each side of the road. Contractor on the project was the Mansfield Asphalt Paving Co.

The specifications called for two 4-inch layers of crushed stone and a 3-inch layer of asphaltic concrete. The maximum size of stone permitted was 4 inches. Although the specifications called for a 2-foot width, the stone was laid to a 30-inch width, and the asphalt to 27 inches.

Crushed stone, delivered to the job site by dump trucks, was fed into an Apsco widener which placed it in previously dug trenches. The widener was also used to spread the hot-mix asphaltic material. As soon as the end of the widening strip was reached on one side, the Apsco widener was reconverted for laying crushed stone on the opposite side of the road; operations were resumed in about half an hour.

Scrapers and Dump Wagons

Scrapers and bottom-dump wagons are the subjects of two new folders put out by The Heil Co., 3000 W. Montana Ave., Milwaukee, Wis. Bulletin RM-48031 contains specifications on the Model 2H700 tractor, the Model OC-MS-16 trailer scraper, and the Model MW-18 bottom-dump wagon. Bulletin RM-48028 contains specifications on five models of open-top twin-cable scrapers. These vary in capacity from 6 to 25 yards.

Bulletin RM-48031 describes the Hydro-Steer unit, the low-torque drive,

the cable power-control unit, the air brakes, and other Heiliner features. Specifications cover capacity, dimensions, wheels and tires, brakes and clutch, and other features.

Bulletin RM-48028 emphasizes the open-top construction of Heil scrapers

and how it increases heaped load capacity. A series of pictures shows how the units are designed to pick up a full load, and how they can be used in spreading or grading operations. Specifications cover construction features, capacities, dimensions, wheels and tires,

depth of cut and spread, etc.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 43.

Vice Pres. of Marlow Pumps

Vincent Vandervoort is elected Vice President of Marlow Pumps, Ridgewood, N. J. He has been with the company since 1947.



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Vermont Constructs New State Building

Five-Story Office Built With Concrete Columns and Slabs; Marble and Granite Facing on Three Sides

TO give its various departments suitable floor space, the State of Vermont is constructing a five-story-and-basement office building in Montpelier, the capital of the Green Mountain State. The new \$1,250,000 State Office Building is being constructed on the south side of State Street, across from the State House, by the Building Construction Division of B. Perini & Sons, Inc., of Framingham, Mass., as general contractor. Work on the building got under way in April, 1948, and is scheduled for completion this June.

The structure has a 194-foot front on State Street, is 66 feet 10 inches deep, and is of reinforced-concrete column and slab construction. The front and two sides are faced with the native granite and marble for which Vermont is famous, while the back wall is of red brick.

The site was occupied by houses that quartered several state departments. Two of these houses were demolished, while two others were moved to a new location where the departments that they shelter are continuing to function until the new building is ready for occupancy. The departments tenanted the houses that were razed have found office space in other parts of the city as a temporary measure, until they too can move into the new building. Up until the present, the many state departments have been scattered around in buildings that could accommodate only a few departments at the most. Now they will all function under one roof in the new, modern State Office Building.

Slab Foundation

Finding the necessary space into which to move the departments which occupied the building site held up the start of excavation and foundation work for the new structure. But the site was finally cleared, and an Osgood ½-yard shovel was moved in to excavate the foundation. A large hole was dug into the gravelly sand site; some of the material was hauled away and wasted, while the rest was stockpiled for use later as backfill. Then a concrete slab or raft-type foundation was poured on a compacted-sand base, and heavily reinforced with 1¼ and 1½-inch steel rods. No piles were employed.

The slab varied in thickness from 2 to 4 feet, with the greater depth in the center to support the larger-size columns. Sand and stone for the concrete were supplied by the Healy & Ryan Sand & Gravel Co. of Plainfield, Vt., while Lehigh cement in bags was shipped to Montpelier from Allentown, Pa. For a few pours, truck-mixed concrete, supplied by the Vermont Concrete Pipe Corp. of Montpelier, was used. The reinforcing steel came from the Bethlehem Steel Co. in Boston.

Mixing was done on the site in a CMC 2-bag mixer, and the concrete was chuted from 2-wheel buggies into wooden forms. The foundation slab was completed by the end of May, 1948, after which the basement walls and the area-way enclosure walls were poured in plywood forms. At the front and sides of the building, the basement walls are 2 feet 2 inches thick; at the rear, the wall is 1 foot 1 inch thick. The bottom of the foundation slab is about 10 feet below the level of the finished grade line around the building.

Column and Slab Construction

The framework of the building consists of some 50 reinforced-concrete columns which support the floor slabs and roof. The largest columns, measured



C. & E. M. Photo

To provide suitable floor space for its various departments, Vermont is constructing a 5-story-and-basement office building in Montpelier. Here it is pictured from the lawn of the State House.

at the base, are 28 x 40 inches, and are placed at the corners to buttress the foundation. The average interior column is 28 x 14 inches at the bottom, and decreases gradually to 24 x 10 inches at the top. The columns divide the long

side of the building into three bays—a center corridor 9 feet 8 inches wide, running east and west from one side of the structure to the other, with a 25-foot 10-inch bay on either side. In

(Continued on next page)

Four hours ago this complete elevator was on a truck



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C. & E. M. Photo
Superintendent John F. Apsit with his cocker spaniel Blackie—or "Assistant Cement Finisher" as he's usually called because he likes to poke his nose into concrete when it's still wet.

Vermont Constructs New State Building

(Continued from preceding page)

the other direction the columns average 16 feet on centers. The smallest span at the rear of the building is 7 feet 7 inches, and the largest span near the ends is 19 feet 10 inches.

Forms for the columns were built of $\frac{5}{8}$ -inch plywood backed with a vertical 2 x 4 at each corner and another at the center of each side. McMillan steel column clamps were then secured in place around the forms at 2-foot vertical intervals. The heights on the different levels varied slightly—the first-floor ceiling height is 10 feet 9 inches; the second, third, and fourth floors are 10 feet 5 inches; while the fifth floor and basement are 10 feet flat. The building is 60 feet high above the finished grade, or 70 feet 1 inch from the finished basement floor to the roof. The first-floor level is 8 feet above the finished grade line of the ground.

The columns were poured first, of course, followed by the floor slab on the next day. A Republic Fireproofing floor slab was used, consisting of concrete slag blocks measuring 8 x 16 x 10 inches, hollow in the center yet very strong despite their light weight. The hollow center was exposed on one side, and two blocks were placed together, open end to open end, to form a block 16 inches square and 10 inches high. Between the rows of blocks the spacing varies from 4 to 6 inches, and in this slot reinforcing rods were placed. Concrete was then poured over this pattern, binding the grids together and filling in to 2 inches above the top of the blocks. The 12-inch-deep beams surrounding the blocks tie in to the columns.

Form Work

Forms are always a significant feature of concrete-building construction. The lower walls, below the level of the first floor, were poured into forms made of $\frac{5}{8}$ -inch plywood backed by 3 x 4 studs on either 14 or 16-inch centers, and double 3 x 4 wales. The spacing of the wales varied somewhat, being 2 feet 4 inches or 2 feet 6 inches near the bottom, and increasing slightly to a 3-foot spacing as the walls went up. Richmond Snap-Tys held the opposite sides together, and they were spaced from 2½ to 3 feet apart.

To support the form for the floor slab, an array of 3 x 4 uprights was erected on 4-foot centers both ways, and 3 x 4 purlins were laid across the tops of the vertical pieces. Over the purlins were placed 3 x 4 joists on 19-inch centers to support the $\frac{5}{8}$ -inch plywood on which the floor-block system was laid out. With these forms, weights from 150 to 250 pounds per square foot were

easily upheld. Form building was speeded with the use of a Wilson hand saw and a Red Star Multiplex 30A table saw, both electrically driven.

As each floor slab was poured, U-bolts were embedded in the concrete with the ring end left projecting above the surface. They were later used to anchor down the 10-foot lengths of 6-inch I-beams set on 7-foot centers and extending out over the sides to support the Patent Scaffolding for the bricklayers' and stone-setters' staging. As the bricklaying and stone-setting progressed upward, the scaffolding was tied to the next higher floor, and the U-bolts on the floor below were burned off, since they were no longer required for any purpose. The staging in the scaffolds consisted of 16-foot planks.

Concrete Handling

The concrete in the building totaled about 3,000 cubic yards, and the reinforcing steel weighed around 400 tons. Most of the concrete was placed with buggies, but parts of the foundation were poured with the help of the Osgood crane equipped with a 40-foot boom and a concrete bucket. To bring the concrete up to the level of the floor being poured, an Archer 82-foot elevator tower was erected which could handle two buggies at a time. An American two-drum hoist raised the work platform to the desired elevation.


Ducts and boxes for the lighting system were embedded in the floor-slab concrete. The slabs were cured by covering them with shavings and sawdust obtained from local sawmills, and wetting down with water. Slab and column forms were removed after seven days. A Walker Locked-In underfloor distribution system was laid out on top of the concrete slab which had been given a rough screeding and a steel-trowel finish. These metal ducts carry telephone lines, and are set 6 feet apart with double outlets every 2 feet. At frequent intervals there are boxes for inserting the wires.

Then a 4-inch course of dry cinder concrete was laid on top of the slab. It was thick enough to enclose the underfloor distribution system, but not thick enough to cover the outlets. The cinder concrete is a 1:3:6 mix of cement, sand, and cinders, which is mixed and handled in the same way as the regular concrete. As the mix was discharged from the buggies it was spread and screeded, then tamped with a wooden

tamper. The grade was carefully determined by laying $\frac{3}{4}$ -inch round steel rods on top of the cinder concrete at 9-foot spacing, and checking the elevation at 5-foot intervals along the rods. If too high, the rods were tapped with a hammer, and if too low they were raised by wedges. Next a $\frac{1}{2}$ -inch finish course

of 1:2 cement-sand mortar was laid over the cinder mix, level with the top of the outlets in the telephone ducts. The outlets were thus easily dug out as they were needed.

To dry out quickly the surface mortar course, when it was laid in the base—
(Continued on next page)



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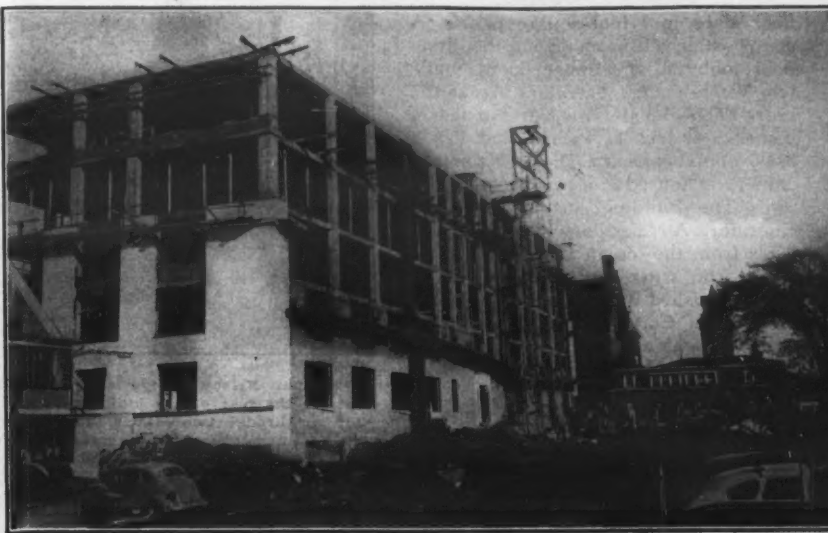
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C. & E. M. Photos
You're looking at the rear or south elevation of the new Vermont State Office Building. Notice, above, the Archer 32-foot elevator tower, and, at right, the Patent Scaffolding for the bricklayers and masons. The glimpse of marble at the right is at the southeast corner of the building.



ment, a Herman Nelson self-powered heater was used to blow hot air through two 12-inch-diameter canvas tubes. Asphaltic tile was then laid over this cement-sand topping on all floors. The roof slab is covered with 2 inches of Celotex insulation pasted to the concrete with hot pitch, and then topped with a 6-ply tar and gravel surface.

Marble Walls

At the front of the building around the base is a 4-foot-high grass course of granite, 8 inches thick, while above that the walls on the front and sides are marble. The marble averages 4 inches in thickness except at the window sills where it is 12 inches thick. The stone was delivered to the job by trailer truck—the marble from the Vermont Marble Co. at Proctor, Vt., and the granite from the Anair Granite Co. of Hardwick, Vt. All the stone work, and the bricklaying for the back wall, was handled by Barton & Wood, Inc., of Boston, Mass.

The heavy stone—some of the individual pieces weighed as much as 2 tons—was handled in several ways. The pieces were usually raised to floor level on the hoist elevator, if the tower was not entirely taken up by the bricklayers. The tower was equipped with a Chicago boom by which the stone was also raised to where it was needed. Around the three sides of the building taking the stone, a steel I-beam monorail was installed by supporting it with brackets clamped to the columns. On this monorail traveled a hoist that was used for lifting and setting the stone in place. As the work progressed upward, the monorail was raised higher. On this job it was used at three different levels.

Each piece of stone had at least two
(Continued on next page)

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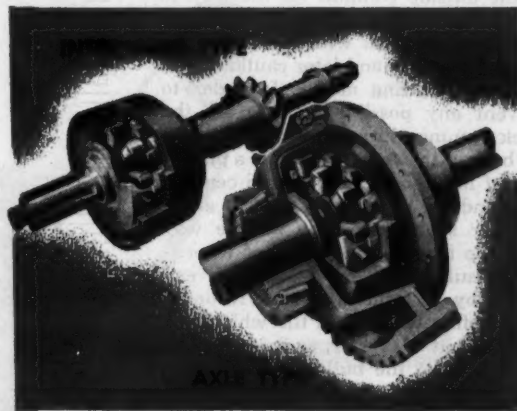
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C. & E. M. Photo

Cinder concrete for the State Office Building floors is mixed in this CMC 2-bag mixer, then carried by buggies to the elevator hoist.

floor slabs in 1-foot-square panels. A center stairwell leads from the first-floor lobby to the upper floors, while two Westinghouse elevators are at the rear. Each elevator measures 8 feet 4 inches x 6 feet 11 inches, and has a 3,000-pound capacity. The elevator machinery is housed in a penthouse on the roof. The building has its own incinerator. An auxiliary pair of stairs leads from the fourth to the fifth floor. Light iron work and the steel stairs were furnished by the Vermont Structural Steel Corp. of Burlington. The hollow metal doors and frames came from the Art Metal Construction Co. of Jamestown, N. Y.

The basement will contain a lunch room, storage areas, and file space—also the janitor's quarters. The five floors will house the various state departments. No interior partition work is included in the contract. When the building is completed, portable partitions will be installed, but these will be such that they can easily be shifted about later on in order to meet the



C. & E. M. Photo

A Herman Nelson self-powered heater outside the rear of the building blows hot air through two canvas tubes into the basement to dry out a surface mortar course recently laid.

changing needs of a department.

Construction Personnel

The Building Construction Division of B. Perini & Sons, Inc., employed an
(Concluded on next page)

Vermont Constructs New State Building

(Continued from preceding page)

Conover aluminum anchors pre-drilled into it before it was set in place. The anchors were secured to the brick backing that was laid behind the stone to a thickness of from 8 to 20 inches. These inner brick walls, in turn, are tied in to the outside columns all the way to the top, and also to the floor slabs. The marble is set first, with the joints cemented together and later caulked with Vermont pointing mastic. In order to prevent any possible stains from the brick coming through on the marble, the back of the stone was given a plaster coat of Medusa white portland cement.

Behind the inside brickwork is an 8-inch air space extending all the way from the first floor to the roof to provide insulation. This opening is enclosed by a 4-inch wall of National Fireproofing terra-cotta tile which was given a coat of plaster, as it is now the inside wall of the building. The entire rear wall, which cannot be seen from the street, is of red brick. All brick for the building was furnished by the Drury Brick Co. of Drury, Vt.

Outside Features

By the end of November, 1948, the walls were finished, completely closing in the building. Thus the contractor was able to work throughout the winter on the inside of the building which is heated by an existing central heating plant in the rear. Radiators were connected so as to have heat available, and glass was installed in the aluminum-sash windows supplied by Sterling Windows, Inc., of New York City. Aluminum molding extends continuously along each set of windows of the second, third, and fourth floors.

The building is about 40 feet back from the sidewalk and faces north, with a driveway on the east side leading to a parking area in the rear. A granite retaining wall runs along the sidewalk. Above the main entrance on the State Street side are the words "State Office Building". Between the fourth and fifth floors, on the front and two sides of the building, are written in stone, in letters 18 inches high, the names of the fourteen counties of Vermont.

Inside the Building

On entering the building from the front entrance, one goes up a short granite stairway to the first-floor level. Here is the lobby which has floors and walls of marble and is lighted indirectly by recessed fixtures. Lighting in the corridors is also concealed, but the rest of the building is equipped with drop lights. The lobby and corridors have hung ceilings, but elsewhere acoustical tile is glued to the under side of the



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CP Portable Air Compressors are available in gasoline-driven models of 60, 105, 160, 210 and 315 c.f.m., actual capacity, and in Diesel-driven models of 105, 160, 210, 315 and 500 c.f.m.

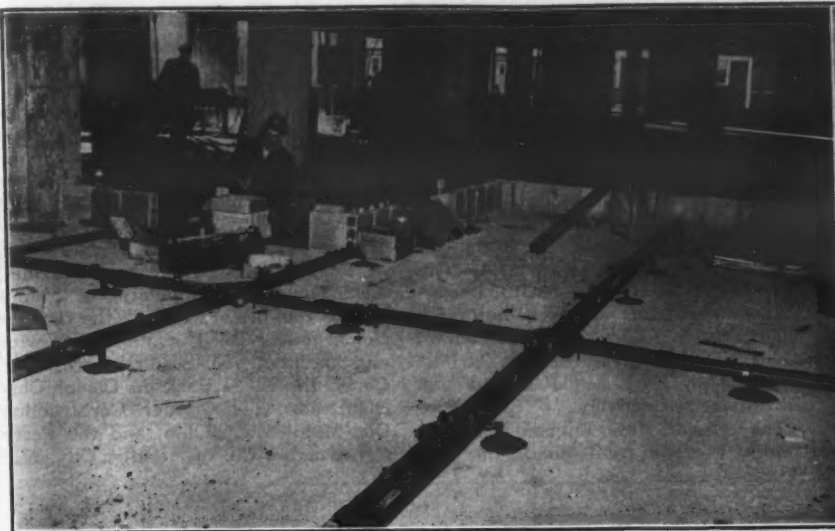
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C. & E. M. Photos

First floor interior views of the Vermont State Office Building—above, the Walker Locked-In underfloor distribution system laid on the concrete floor slab, with metal ducts to carry telephone lines; at right, the same view after the cinder-concrete fill has been placed and before the sand-cement surface is laid.



average force of 85 in the construction of the new State Office Building for Montpelier, Vt. Irving P. Rocheford is General Manager of the project, and John Apsit is Superintendent. Freeman-French-Freeman of Burlington, Vt., were the Architects. R. E. Cruishank, Building Commissioner of the State of Vermont, is directing the work.

Light-Duty Screens

A new line of light-duty vibrating screens has been brought out by Screen Equipment Co., Inc., 1750 Walden Avenue, Buffalo 21, N. Y. The Mighty-Mites are designed to simplify a number of small screening jobs often hand-done.

The new line comes in single and double-deck models in 1½ and 2-foot widths and in 3, 4, 6, and 8-foot lengths. Triple-deck models are available in smaller sizes. The screens have 3/16-inch steel side panels and steel-base frames. Their operation is said to produce a positive eccentric action and a maximum vibration amplitude of 3/16 inch.

The shaft contains four ball bearings and is protected from dust, dirt, and damage by seamless steel tubing and a grease-sealing arrangement. The Mighty-Mites are powered by 1 to 2-hp motors. According to the manufacturer, they have screen speeds up to 1,150 rpm and will handle loads of up to 15 tons per hour depending upon the type of material and the size of the wire-cloth openings. They may be rigidly mounted or hung from overhead supports.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 66.

Staff Changes for Fuller

Three appointments within its Sales Department are announced by the Transmission Division of the Fuller Mfg. Co., Kalamazoo, Mich. They are: J. A. Packard, Manager Original Equipment Sales; L. C. Butler, Manager Service Sales; and B. S. Tooker, Service Manager.



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Lettering Instrument Permits Size Control

Wide or narrow, tall or short letters in any combination can be produced automatically from one template with the Varigraph, a precision lettering instrument available from The Varigraph Co., Inc., 2715 Vine St., Lincoln 3, Nebr.

The Varigraph templates come in two sizes and with several styles of letters. The full-size template allows settings of from 0.150 to 0.750 inch in height and width; the half-size, from 0.075 to 0.375 inch. Letter styles include engineering vertical, engineering slant, architectural roman, architectural subtitle, architectural single stroke, cartographic roman, cartographic roman italic, and others. The letters are arranged according to their frequency of use, rather than alphabetically.

The Varigraph instrument is designed for use with a lettering pen now on the market. A small lever at the forward edge of the instrument raises and lowers the pen into inking position. The instrument can be used by either right or left-handed draftsmen by swinging it through 90 degrees on the template.

Further information may be secured from the company, or by using the Request Card at page 16. Circle No. 95.

Wood Preservative

A chemical wood preservative in liquid form is announced by The Tremco Mfg. Co., 8701 Kinsman Road, Cleveland, Ohio. It can be applied by impregnation, dipping, brushing, or painting, and either before or after the wood is installed or erected.

The Tremco preservative has a two-fold purpose: to keep the wood from rotting, and, by keeping out moisture, to reduce the possibility of shrinkage and warping. Also, because it lays the grain of the wood as it is applied, it is said to simplify painting operations. The preservative is furnished in two forms—clear and green. The clear is used where the wood will receive a clear varnish finish, the green in all other cases.

Further information may be secured from the company, or by using the Request Card at page 16. Circle No. 102.

AGC Makes Safety Awards

Seven awards and numerous certificates for safety were presented at the 30th annual convention of The Associated General Contractors of America, Inc., as part of a continuous campaign for safety in the construction industry. The awards went to member firms who finished in leading positions in the annual accident-prevention contest for the year ending September 30, 1948. Two groups of prizes were awarded in each division of the AGC: one from those companies with above-average man-hour exposure, and one from those with below-average exposure.

First prize in the Building Division among companies with an above-average exposure went to E. J. Cross Co., Worcester, Mass.; for below-average, to Thomas H. Bentley & Son, Inc.,

Milwaukee, Wis. The average exposure in this division was 397,456 man-hours. In the Highway Division, prizes for the two groups respectively went to Burrell Construction & Supply Co., New Kensington, Pa., and to Thorpe Construction Co., Akron, Ohio. The average was 293,800 man-hours. In the Heavy Division, the Holmes Construction Co., Wooster, Ohio, and C. F. Lytle & Amis Construction Co., Cambridge, Nebr., won first place in each group. The average exposure was 839,525 man-hours.

In the Building Division, second and third-place winners in the above-average-exposure group were Bryant & Detwiler, Detroit, Mich., and Wermuth, Inc., Fort Wayne, Ind. The other second and third-place awards in this division went to Faulkner Construction Co.,

Ferndale, Mich., and the Lovering Construction Co., St. Paul, Minn. In the Highway Division second and third places in each group respectively went to Koss Construction Co., Des Moines, Iowa, and A. J. Baltes, Inc., Norwalk, Ohio; and to George K. Werner & Son, Clay Center, Nebr., and Diesel Oil Sales Co., Seattle, Wash. In the Heavy Division, second and third places were held by C. F. Braun & Co., Alhambra, Calif., and the Fluor Corp., Ltd., Los Angeles, in the group with above-average exposure. In the below-average-exposure group, L. Walker Fauber, Ashland, Ohio, and Herbert F. Darling, Williamsville, N.Y., held second and third place respectively.

The special New England Division Contest was won by its donor, the E. J.

Cross Co. Second and third prizes went to Volpe Construction Co., Malden, Mass., and H. O. Cummings Construction Co., Ware, Mass.

The AGC also cited six member firms for having the best records among those firms which competed in all accident-prevention contests in the five years ending September 30, 1948. First prize in the group with above-average exposure went to Newbery Electric Corp. of Los Angeles, Calif., and Phoenix, Ariz. For the below-average-exposure group, the prize went to the Thorpe Construction Co. The other four with outstanding 5-year records were Fluor Corp.; the A. L. Jackson Co. of Chicago; Martin L. Bauer Construction Co., Middletown, Ohio; and the Ferry Construction Co. of Atlantic City, N.J.



Listen to James Melton and "Harvest of Stars" every Sunday, NBC.

CRAWLER TRACTORS • WHEEL TRACTORS • DIESEL ENGINES • POWER UNITS



Speed-Governor Unit For Air Compressors

A governor designed to regulate the speed of air compressors according to the demand for air is announced by Schramm, Inc., West Chester, Pa. The Pneumastat is made in sizes to fit all Schramm compressors including Models 105, 210, 315, and 420. It brings about fuel savings of as high as 50 per cent, says the manufacturer.

As the pressure increases, the Pneumastat automatically adjusts itself to balance the throttle in a new position, Schramm points out; this change in position causes a reduction in the speed of the compressor. With this arrangement the compressor operates continuously from about one-half to full capacity with loading and unloading, and the cycling between full speed and idle speed at part load is thereby eliminated.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 15.

Vibrators in Three Sizes

Features of the Dart high-speed concrete vibrators are listed in a 4-page folder available from the Dart Mfg. Co., 1246 Champa St., Denver 4, Colo. The folder stresses the vibrator's replaceable head bearing, non-collapsible housing, flexible core, compact design, variable speeds, and rubber-tire mounting.

The Dart vibrators are made in three sizes, each of which is described in detail. The catalog lists the horsepower

rating and make of power unit of each, the diameter of the vibrator head, and its shipping weight and volume.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 84.

Allen Wagner Joins ARBA

Allen Wagner has been named Director of Public Relations of the American Road Builders' Association. Mr. Wagner formerly held a similar position with the American Society of Civil Engineers. His offices are at the association's headquarters in Washington, D. C.

A former Twin Cities newspaper man, Mr. Wagner was in charge of public relations for the Minnesota Mining & Mfg. Co. before joining the staff of the ASCE.



Here are some of the intricate cuts the new Tyler band saw can make in steel, plastic, foam rubber, etc. Its spiral blade and planetary transmission account for the performance.

Powered Band Saw Has a Spiral Blade

A power band saw featuring a spiral blade is announced by the Tyler Mfg. Co., 6151 W. 98th St., Los Angeles 45, Calif. According to the manufacturer, the Tyler saw will make all types of intricate cuts on steel, plastic, foam rubber, and similar materials, and will follow any line that can be drawn.

The spiral blade is designed to present a 360-degree cutting edge which will operate in any direction. The planetary transmission provides a saw speed range of from 70 to 5,000 rpm, with any choice of speed possible in this range.

The Tyler saw has an all-metal construction and dynamically balanced wheels to eliminate vibration. The combination guide permits the use of spiral or conventional flat blades. The saw unit is 60 inches high and has a 12-inch throat, an 8½-inch clearance under the guide, a table tilt of 45 degrees to the right and 5 degrees to the left, and a 4-inch blade-tension adjustment. It is powered by a ½-hp 110-volt electric motor.

Further information may be secured from the company, or by using the Request Card at page 16. Circle No. 103.

Concrete Pipes Made In Sizes to 24 Inches

A machine for making concrete pipe from 4 to 24 inches in diameter and in 24, 30, and 36-inch lengths, is announced by the Martin Iron Works, 1222 E. 28th St., Los Angeles 54, Calif. The machine uses the packerhead process and is designed for large-volume production. According to the manufacturer, the Martin Model 48 will produce 4 and 6-inch pipe at the rate of two per minute; 8 to 16-inch pipe at the rate of one per minute; and 18 to 24-inch pipe at a speed of one pipe every two minutes.

The multi-speed transmission, combined with an adjustable hydraulic system, is said to provide the proper troweling and packing action of the packerhead as it revolves and rises through the jacket. Other features include variable speed with no belts or sprockets to change, adjustable lift with finger-tip control, compact design, ball and Timken bearings throughout, oil-bath lubrication system, ball-bearing side guides, one main control, quick-thread spud tip, shear-pin safety device, and easy alignment of packerhead, hopper, and table.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 49.

Drake Ups Dennis Tiberis

Dennis E. Tiberis is the new Director of Sales for Drake America Corp., New York City. He will supervise the activity of the export and import divisions of Drake America and the Hill Diesel Engine Division.

GOOD MEDICINE

Just what the doctor ordered... red-painted International Diesel Crawlers keep balance sheets healthy by boosting production and guarding costs. They deliver their full-rated horsepower on every job, yet hold in reserve additional lugging ability for handling sudden overloads that would otherwise kill.

Their starting and combustion systems, fuel feed, speed governing, torque control,

lubricating methods and overall rugged construction account for their superior performance and long-lived stamina.

Since reliable, economical power is "good medicine" for any power-using business, it will pay you to contact your International Industrial Power Distributor. Get International Diesels on your jobs now.

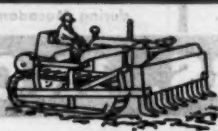
INTERNATIONAL HARVESTER COMPANY, Chicago



An International TD-18 Diesel Crawler fills its 8-yard scraper quickly on this tough, deep-sand road job. Latest model, with increased drawbar horsepower and many improvements, is now available.



INTERNATIONAL INDUSTRIAL POWER



Rolled-Earth Dam Is Built Against Floods

(Continued from page 3)

by Caterpillar DW10 rubber-tired tractors. The scraper and crawler-tractor units, in hauling from the hillside borrow pit, climbed 15 per cent grades when they were going for a load and descended some 25 per cent grades on the way back with a full bowl. A D8 pusher was around to help with the loading of the DW10's when required, and a couple of D8 dozers spread and levelled the material on the fills.

Big chunks of the clay were broken up by a tractor-pulled Rome disk equipped with 24-inch blades, 8 in front and 8 in back. Compaction was achieved by 2 American Steel Works 5-foot-diameter and 2 LaPlant-Choate 4-foot-diameter sheepsfoot rollers, two pairs in tandem, pulled by a D8 tractor. Water was added when required from a 1,000-gallon tank truck. Final shaping was done by a Caterpillar grader which also maintained the haul roads. The average haul with the scrapers was 1,000 feet.

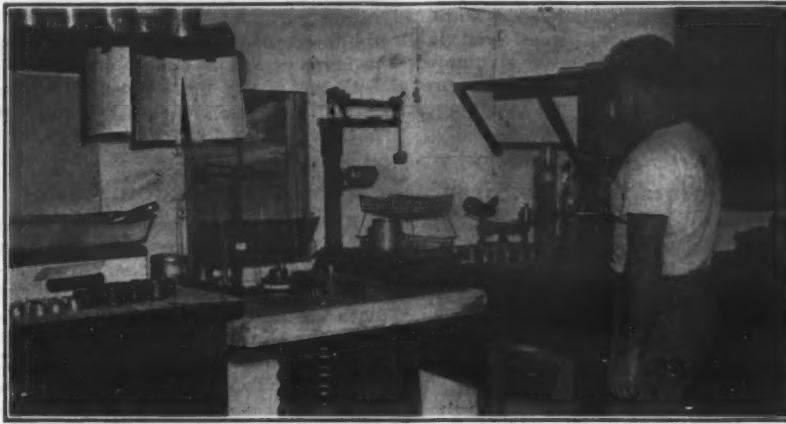
Pervious Material

The coarse, gravelly sand used for the pervious fill was taken from a borrow pit that was covered with from 6 to 12 feet of silt-clay overburden. The latter was stripped off and spoiled near the pit. Then a vertical face, 30 feet high, was exposed in this ancient glacial deposit and a bench cut about halfway up. Two TL 20 Thew-Lorain shovels, with their ½-yard buckets built up to ¾-yard size, worked the pit. One dug into the lower 15-foot face, while the other, from the bench, cut into the upper 15-foot wall. They generally kept about 75 feet apart.

A fleet of from 12 to 15 trucks, averaging 4 yards in capacity each, hauled the pervious material one mile to the dam site over U. S. 24 and the relocated Oakwood Road. Motor graders kept the haul roads in shape for the trucks. Two 300-gallon gasoline tanks were set up in the pit to keep the trucks in fuel. On the fill the trucks end-dumped the pervious material which was spread by D6 and D7 dozers. Two passes of 10-ton tractors were required for compaction, but no sheepsfoot rolling was called for with the pervious material. The tractor-dozer spreading the material fulfilled the weight requirements for compaction with their added equipment.

Wetting the pervious material as it was placed in the embankment was a major consideration. About 22 gallons of water was added to every yard of pervious material in order to get the desired compaction. As the fill was placed, it was saturated with a stream of water shot out over 100 feet from a 2½-inch fire hose; the pressure was supplied by a Chrysler 500-gpm pump. If more water was necessary, it was added by gravity flow from a 2,500-gallon trailer-mounted tank equipped with an 11-foot spraybar and tractor-pulled.

At the start of the job the water for the fill was obtained by impounding Fondulac Creek. Later, when the first drainage well, 72 feet deep, was dug, the water was pumped from the well into a



C. & E. M. Photo

In the field lab which the USED set up at Fondulac Dam, Technician William Smith analyzes soils by means of the Bouyoucos hydrometer method. On the concrete slab at his left are a gram balance and a Fairbanks-Morse platform scale.

reservoir by a Pomona 400-gpm pump. From there it was pumped either through the fire hose or into the trailer tank.

The contractor and subcontractor to-

gether placed about 5,000 cubic yards of material in the embankment during the average single-shift 10-hour day. This included both pervious and impervious material.

Drainage Wells

At the downstream toe of slope is a row of ten drainage wells about 100 feet apart and from 30 to 75 feet deep. Water from these free-flowing wells empties into a collector ditch which carries it off to the outlet channel.

Having the water rise in these wells relieves the water pressure that may build up under the dam. These wells are essential in the type of soil on which the dam is built, for the foundation in this old glacial valley consists of irregular and non-uniform laminated formations of pervious and impervious material. There was no point in digging a core trench through this material, since the foundation could never be sealed off. By using pervious fill, with its higher internal friction value, on the downstream side of the dam, additional stability was gained. Also, relief was secured from the hydrostatic pressure built up beneath the dam due to the head of water on the upstream side. Sinking the wells to the lowest pervious

(Concluded on next page)

SEAMAN PULVI-MIXER

CONSTRUCTION OF BLACK TOP ROADS
SOIL CEMENT PROCESSING
CONSTRUCTION OF WATER BOUND MACADAM
MIXING SOILS AND BINDERS
REPAIR OF BITUMINOUS PAVEMENTS
AERATION OF AGGREGATE
SOIL PULVERIZATION PRIOR TO COMPACTION
STABILIZING HIGHWAY SHOULDERS
TILLAGE FOR SEED BEDS

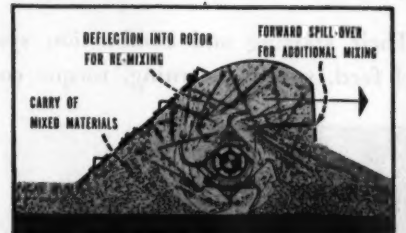
A VERSATILE, ONE-MAN MACHINE



• There's no end to the jobs on which you can profitably employ a Seaman Pulvi-Mixer. It's the most versatile machine on the market . . . can be kept busy around the clock, the year 'round . . . will pay for itself many times over frequently on a single job.

• Why invest in a costly single-purpose unit when a Seaman will do any job equally well and also handle a wide variety of other jobs? A Seaman is lower in original cost—lower in operating cost—lower in maintenance cost—which means lower net cost per yard, per mile or per job.

• Over the entire nation, Contractors, Cities, States and Counties are building roads, streets, airports, parking areas, etc., with Seamans. It's the one machine that does a better job on any job. May we send you complete details, today?



Better Mixing at Lower Cost

VERTICAL — Powerful rotor sweeps sub-grade clean, lifts soil and throws it in every direction, breaking it into minute particles for thorough blending with binder from top to bottom.

LATERAL — Pitch and curvature of tines throws material from side to side to equalize the blend within the entire width of the mixer.

LONGITUDINAL — A considerable portion of the material is carried forward over the rotor frequently as far as 50 feet to be continuously remixed, assuring uniformity of texture longitudinally.

SELECTIVE — Aggregate distribution is more uniform between coarse and fines, leaving a blanket of fines over the entire top surface.



The Seaman Mixer handles all types of bituminous mix-in-place construction.



All types of soils and binders are effectively mixed with the Seaman Mixer.



The Seaman is ideal for mixing in fines during Macadam base construction.

STERLING LIGHT PLANTS

THE CHOICE OF LEADING CONTRACTORS

SIMPLE—DEPENDABLE—RUGGED

WRITE FOR LITERATURE

STERLING MACHINERY CORPORATION
405 Southwest Blvd. Kansas City

SEAMAN MOTORS, INC.

282 NORTH 25TH STREET, MILWAUKEE, WISCONSIN

stratum enabled the water to come up and the pressure to be relieved. If the water had to come up through impervious material, cleavage might result.

The Kelly Well Co. of Grand Island, Nebr., put down the wells. They consist of 4-foot lengths of 2-inch-thick concrete pipe, 6-inch inside diameter and 10-inch outside diameter. A 4-foot length of pipe contains 24 horizontal slits, $\frac{1}{8}$ inch high by $1\frac{1}{4}$ inches wide, arranged in four vertical rows, six slits to a row. The openings admit the water but keep out the dirt.

Drilling

To drill the wells, an A-frame consisting of two 12-inch poles 44 feet long was set up over the site. The hole was drilled by rotating a 26-inch bit with a CMC 2-drum hoist. For the first 15 to 20 feet a $\frac{3}{16}$ -inch steel casing was lowered into the hole made by the bit. In dry material a small orange peel bucket handled the excavation for about as far as the steel casing went down. The bucket was hung from the A-frame and hoist. Farther down, and also in wet material, a mud pump that had a 6-inch line and was driven by an Allis-Chalmers power unit cleaned out the hole. The pump sucked out a mixture of sand, gravel, dirt, and water.

Below the steel casing the bit made an open hole the rest of the way to the desired depth. After the material had been excavated, the concrete pipe containing the slits was lowered down in the middle of the hole. The first length resting on the bottom has a solid plug base, but the rest are all open-end sections to provide the well. Outside the pipe the 26-inch-diameter hole was backfilled with gravel up to the bottom of the impervious surface soil. An impervious mixture of sand and Aquagel was tamped in above this for a seal. The drainage-well system was then finished off by constructing the collector ditch with grouted riprap around each well. The deepest well was drilled in 3 working days.

Quantities and Personnel

The major items in the Central Engineering Co. contract include the following:

Excavation	500,000 cu. yds.
Pervious embankment	132,000 cu. yds.
Impervious embankment	376,400 cu. yds.
Concrete—spillway	8,500 cu. yds.
Reinforcing steel	600,000 lbs.
Steel H-beam piling—under stilling basin	9,300 lin. ft.

For the Central Engineering Co., Tom Nobis is General Superintendent and H. D. Parsons is Grading Superintendent on the embankment fill. William H. Nelan directed his own forces on the subcontract for the impervious fill. L. C. Enzminger was Superintendent for the Kelly Well Co.

The Corps of Engineers is represented on the project by J. M. Gano, Resident Engineer, and Major A. F. MacDonald and a staff of assistants. A well equipped field laboratory was set up on the project for analyzing and testing soils before they were put in the fills.

The Chicago District, Department of



the Army, Corps of Engineers, is headed by Colonel W. P. Trower.

Corps of Engineers Photo

The outlet works for Fondulac Dam consist of this concrete conduit 395 feet long with intake and discharge structures at left and right ends respectively.

Long Concrete Drills

Extra-length rotary concrete drill bits are available from the Concrete Termite Drill Co., 1628-A E. Walnut St., Pasadena, Calif. They come in stock lengths of 12, 18, 24, and 36 inches

and may be used with any standard electric drill. They are made in 1/16-inch sizes from $\frac{1}{4}$ to $1\frac{1}{2}$ inches in diameter.

These drills are recommended by the company for boring holes in concrete, brick, masonry, and similar materials. According to the manufacturer, the drill

will operate without cracking the material or deviating from a straight line. It is said to depend on a patented rotary pulverizing action rather than on sharp cutting edges or hammer-like blows.

Further information may be secured from the company, or by using the enclosed Request Card, Circle No. 40.

UNIVERSAL

HAS THE ANSWER TO YOUR WASHING PROBLEMS WITH "STREAM-FLO" ENGINEERED WASHING PLANTS



Stationary washing plant with mechanical feed, conveyors, vibrating screen, water sprays, sand screws, loading bin, primary and secondary crushers, and stock piling conveyors. Electric powered.



Crushing screening and washing plant with primary jaw crusher, secondary roll crusher, scrubber classifier, conveyors, and bins.



Universal washing and screening plant with plate feeder, conveyor, two deck screen, 3-compartment bin, sand screw, and miscellaneous sprays, chutes and flumes. Gasoline or diesel power.

Universal builds stationary and portable plants to meet any washing need. "Basic Unit" construction means lower initial cost, and "Stream-Flo" engineering assures a well balanced, smooth operating plant. Result—more yards per hour at less cost per yard. For profit-making production of clean, properly sized aggregate, investigate Universal.

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DIVISION OF PETTIBONE MULLIKEN CORPORATION

ENGINEERS AND BUILDERS OF "STREAM-FLO" ROCK, GRAVEL, AND LIME PLANTS
SCREENING AND WASHING PLANTS, CONVEYORS, APRON FEEDERS

OTHER PETTIBONE MULLIKEN PRODUCTS



PETTIBONE BUCKETS

HAISS BUCKET LOADERS



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SWIVEL CONVEYOR TYPE BUCKET LOADER

UNDER CAR UNLOADER



PORTABLE BELT CONVEYOR

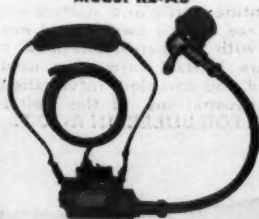
PETTIBONE MULLIKEN CORP.

CHICAGO, ILLINOIS

GEORGE HAISS MFG. CO., INC.

BRONX, NEW YORK, N. Y.

"BERG" CONCRETE SURFACER Model R2-AS



A light-weight, portable, electric motor-driven Concrete Surfacers consisting of the Model R-2 Right Angle Head and Model AS Motor Unit.

Ideal for surfacing concrete construction and other applications. Quickly converted into the Model V2-AS Concrete Vibrator for internal vibration by substituting the Model V2 Vibrator Unit for the above Head.

The Concrete Surfacing Machinery Co.
4605-4609 Spring Grove Avenue, Cincinnati 32, Ohio

Big Paving Project On Lincoln Highway

**Three Contractors Lay 3
And 4 Lanes of Concrete
On 15½-Mile Pennsylvania
Job; Cost \$3,802,247**

By WILLIAM H. QUIRK,
Eastern Editor

† THE Lincoln Highway, U. S. 30, is being reconstructed for a 15½-mile stretch between Stoufferstown and McKnightstown in southern Pennsylvania. The section being improved is located partly in Franklin and partly in Adams Counties, and is better known locally as the Chambersburg-Gettysburg road. The new reinforced-concrete pavement, from 3 to 4 lanes wide and 9 inches thick, is replacing an old 6-8-6-inch concrete pavement 18 feet wide, which was built in the early 1920's. The job begins 4 miles east of Chambersburg, and runs easterly to a point 6 miles west of Gettysburg.

The Pennsylvania Department of Highways divided the project into three sections in order to speed the construction. The eastern and longest section of 7.1 miles was awarded to C. J. Langenfelter & Son, Inc., of Baltimore, Md., on a low bid of \$1,949,468. The middle and western sections are 4.9 and 3.34 miles respectively. The middle section, which is described here in detail, went to Hempt Brothers of Camp Hill, Pa., on a bid of \$984,310. The remaining section on the west end was awarded to H. J. Williams Co., Inc., of York, Pa., with a bid of \$868,468. Together, the three bids on the 15½-mile project totaled \$3,802,247.

Work on the project got under way in the spring of 1948, and all three contracts will be finished by this summer. Hempt Brothers, although the last to start work, finished paving by October 20 and completed the work for final inspection on December 8.

While most of this middle contract followed the old alignment, except for a couple of short pieces of relocation to eliminate curves, five new bridges were constructed on it. The western end had but two bridges and the eastern section had only one bridge to construct, but more relocation was involved in these two contracts and consequently some heavy grading was necessary. During the construction the highway was closed to all but local traffic. A 40-mile-long detour was provided to the south over State Routes 116, 16, and 316, via Waynesboro. This detour was removed and the highway opened to traffic on November 1.

Hempt Brothers' Contract

The Hempt Brothers' middle contract of 4.9 miles included 3.2 miles in Franklin County on the west end, and 1.7 miles in Adams County on the east end. It ran through Caledonia State Park where the favorable original alignment of U. S. 30 eliminated the need for any extensive relocation. Most of the paving is 33 feet wide and consists of three 11-foot lanes, but about 4,000 feet of the contract called for 4 lanes. The greater width was required on curves and where increased visibility was essential to safety.

On the dual-highway sections, the two 22-foot pavements are separated by a center mall 4 feet in width. This dividing strip consists of two white concrete reflecting curbs on either side, sloping upward to a raised center of plain-concrete pavement. The flat center is 18 inches wide, while the curbs are each 15 inches wide. The 22-foot pavements have a straight slope of ½ inch per foot to the shoulders, which are 8 feet wide in cuts and 10 feet wide

in fills, and which slope at the rate of ½ inch to the foot. The side slopes in both cuts and fills are 1½ to 1. On the 33-foot pavement the crown is at the center line, with a slope of 0.1 inch to the foot to the edges.

Grading

Grading got started early in May, 1948, and had progressed sufficiently for the first concrete pavement to be laid on July 13. The old cracked and broken concrete pavement was removed without trouble. First it was pounded with a steel weight handled by a P&H ¾-yard crane. Then the rubble was disposed of on the fills. Of the 168,600 cubic yards of excavation on the contract, only about 30,000 yards was rock; the rest of the material was a sandy-

clay soil. Drill holes in the rock cuts were made with an Ingersoll-Rand wagon drill powered by an I-R 315-cfm compressor. Atlas Gelodyn No. 1 dynamite was used in the blasting.

Rock, and the material for the long hauls, was moved by Euclids—three 14-yard bottom-dumps and seven 10-yard end-dumps—loaded by a North-west 80-D 2½-yard shovel. On the shorter hauls two scrapers saw service

—a LeTourneau 14-yard pulled by a Caterpillar D8 tractor and a Gar Wood 14-yard pulled by an Allis-Chalmers HD-14C.

A special subgrade material consisting of a 6-inch course of sand was laid on top of the roadway, extending out through the shoulders. The sand was dug from a local borrow pit by a Lorain 2-yard shovel, and hauled to the job in

(Continued on next page)

Plan NOW for NEXT WINTER

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DAVENPORT-FRINK SNO-PLOWS

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FASTER • SAFER • CLEANER SNOW REMOVAL

Right now is a good time to check over your snow removal equipment. It's never too early to order new units or repairs for your present equipment. Planning well ahead of next season will enable you to avoid the inevitable snow-time rush. We'll cooperate with you in every way.



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PLYFORM

Concrete Form Panel



... for Smooth, Fin-Free Concrete Surfaces

*The highly moisture-resistant (but not waterproof) glues used in PlyForm permit multiple re-use of panels (as many as 10 to 15 are not unusual). For the greatest possible panel re-use, however, specify Exterior-type Concrete Form grade of Douglas fir plywood—bonded with completely waterproof phenolic resin adhesive. For special architectural concrete, requiring the highest possible finish, the architect or contractor may specify Exterior-type or Interior-type Douglas fir plywood in grades having "A" (Sound) face veneer—or one of the new plastic-surfaced panels.



BOOKLETS FOR YOU!

Two booklets: "The New Plyform" and "Concrete Forms of Douglas Fir Plywood" are now available. They will help you gain the full advantages offered by Douglas fir plywood concrete form panels. Write the Douglas Fir Plywood Association office nearest you: Tacoma Building, Tacoma 2, Washington; 1232 Shoreham Building, Washington 5, D.C.; 848 Daily News Building, Chicago 6, Ill.; 500 Fifth Avenue, New York 18, N. Y.

PLYFORM—the multiple re-use concrete form panel of Douglas fir plywood—is now manufactured in strict accordance with the new grade specifications set forth in U. S. Commercial Standard CS45-48. Both faces are of B (Solid) veneer—smooth and firm, meeting virtually all concrete requirements.*

Outstanding advantages

offered by the NEW PlyForm include:

- PlyForm forms may be re-used again and again; they're more economical.
- PlyForm produces smooth surfaces, reducing finishing time and cost.
- PlyForm panels are strong, rigid—yet light and easy to handle.
- PlyForm's large panel size covers quickly, economically.
- PlyForm forms are puncture-proof, water and mortar tight.
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- PlyForm is easy to work by hand or with power tools.
- PlyForm provides form sheathing and lining in one material.*

**Douglas Fir
PLYWOOD**

LARGE,
LIGHT,
STRONG

Real Wood
Panels





Working between Heltzel forms and a lane already paved, this R-E 10 Pinegrader prepares subgrade ahead of Hempt Brothers concrete-paving equipment on U. S. 30 in Pennsylvania. Most of this paving is 33 feet wide in three 11-foot lanes.



A joint setter slips a metal cap channel with 3½-inch lips over the top of an asphalt-impregnated expansion joint. These joints were placed every 615 feet on the job; contraction joints were placed on 61½-foot centers. Joint assemblies came from the Bethlehem Steel Co., along with steel mesh reinforcing for the pavement.



Farther down the line, a MultiFoot 34-E paver mixes a batch of concrete, its crawler treads resting on rubber-composition mats to protect the new center-lane concrete.



As the paver discharges a batch to the forms from its 30-foot boom, a Jaeger screw-type spreader strikes it off, then backs up for the placing of steel mesh reinforcing.

Big Paving Project On Lincoln Parkway

(Continued from preceding page)

the three bottom-dump Euclids. There it was spread by an HD-14 dozer and shaped up by two motor graders—a Caterpillar and an Allis-Chalmers—and then rolled by a Huber 10-ton 3-wheel roller.

Considerable drainage pipe was involved on the 4.9-mile contract, including 23,119 linear feet of 6-inch tile underdrain, and 4,256 linear feet of concrete pipe which ranged in size from 18-inch to 60-inch diameter.

Concrete Batch Plant

While the grading was still in progress, a concrete batch plant was set up alongside the road near the west end of the job. Farthest back from the road was a Heltzel 85-ton 3-compartment trailer aggregate bin, which the batch trucks backed under in order to get loaded with sand and stone. They then rolled forward to pass under a Heltzel 125-barrel cement bin. After picking up their load of cement, they moved ahead only a few feet to get back on the highway.

Two sizes of stone—3A and 2B—were used in the mix; they were graded from 2½ inches and 1½ inches down respectively. The stone came from near-by Chambersburg from the Walker Bros. quarry, and was of the limestone variety. Delivery to the batch plant was made by truck, and the stone was stockpiled behind wooden barricades on both sides of the aggregate bin.

Sand was supplied by the Warner Co. of Morrisville, Penna., and was delivered by rail to a siding of the Pennsylvania Railroad at East Fayetteville, 2 miles from the plant. It was unloaded by a P&H crane equipped with a ¾-yard clamshell bucket, and loaded into two dump trucks and a trailer truck which hauled it to the batch plant. There it was stockpiled as the stone was, but to the rear of the aggregate bin.

Bulk air-entraining cement—Key-

C. & E. M. Photos

stone, Dragon, and Lone Star—also was delivered to the siding, and was unloaded by a screw gear under the track and an enclosed elevator into a Heltzel 100-barrel portable cement bin. From this bin the cement was discharged into a covered Mack truck that hauled 6 to 7 tons at a time to the batch plant. There the truck backed up a dirt ramp and unloaded the cement into a hopper. The conventional screw gear at the bottom and an enclosed elevator raised the cement to the storage bin.

Six trucks, owned by the contractor, and holding two batches each, hauled the cement, sand, and stone from the batch plant to the paver on the road. The cement, which was added last, was dumped into individual metal boxes. These were not opened until the batch was ready to be dumped into the paver skip, thus avoiding any loss of cement either through the movement of the trucks or through the wind. At the plant the aggregate bin was kept charged by a Thew-Lorain 75-B crane with a 50-foot boom and a 1-yard clamshell bucket.

The Mix

An 8½-bag batch of 1 : 2 : 3.5 proportions was used in the mix. The dry weights of a typical batch were as follows:

Cement	799 lbs.
Sand	1,453 lbs.
3A Stone	1,377 lbs.
2B Stone	1,377 lbs.

The maximum amount of water added to a batch was 43.3 gallons; in other words, it was added at the rate of 5.1 gallons per bag. Such a batch yielded 1.36 cubic yards of concrete. The gradation of the sand and two sizes of stone was as follows:

Sieve Size	3A Stone	Per Cent Passing	2B Stone	Sand
2½-inch	100	.....	.....	.....
2-inch	90-100	.....	.....	.....
1½-inch	35-70	.....	.....	.....
1¼-inch	.....	100	.....	.....
1-inch	0-15	90-100	.....	.....
¾-inch	.....	20-50	.....	.....
½-inch	.....	.....	.....	100
No. 4	.....	0-10	.....	90-100
No. 20	.....	.....	.....	40-75
No. 50	.....	.....	.....	10-30
No. 100	.....	.....	.....	1-8

(Continued on next page)



Ahead of the Jaeger-Lakewood double-screed finishing machine, which makes two passes over the concrete, a member of the crew spades along the sides of the Heltzel forms.



Finally, an 800-gallon tank truck sprays water on Osnaburg curing mats from a vertical spraybar. These mats were kept wet for three days; then they were removed.

Water for the concrete mix was pumped from a stream in Caledonia State Park at about the center of the job by a Rex 3-inch pump, and forced through a 2½-inch pipe line laid alongside the road. The pipe line reached to the limits of the paving, and had tees at 150-foot intervals for tapping a hose connection to the paver.

Paving Operations

Paving started at the west end of the job and worked towards the east on the north, center, and south lanes—in that order. A total of 4,000 linear feet of Heltzel road forms was available, with always at least 500 feet set in readiness ahead of the paver.

On the side bordering an adjoining lane, a metal keyway was bolted to the face of the form. Longitudinal dowels, ½ inch x 48 inches, were bent at right angles and placed in these keyways on 5-foot centers. Half the dowel extended into one lane perpendicular to the edge of pavement, and when the form was later removed the other half of the dowel was straightened out so as to extend into the adjoining lane. Different spacing of the dowels went into effect at all joints. A dowel was placed 1 foot on either side of the joint; the next pair were 3 feet 1 inch farther on along both sides; and after that, the 5-foot spacing was resumed.

Trenches for the forms were dug in the subgrade by a Cleveland Form-grader, and form pins were driven with an Ingersoll-Rand air hammer powered by an I-R 105-cfm compressor carried on an International truck. Excess material between the forms was then thrown off to the side by an R-B 10 Fine-grader, and the sand base was given a final rolling by a Fordson 3½-ton 3-wheel roller. The grade was then checked with a scratch template pulled over the forms, and any necessary adjustments were made by hand.

Contraction joints were placed on 61½-foot centers, with an expansion joint every 615 feet. The joint assemblies came from the Bethlehem Steel Co. at Johnstown, Pa., along with the steel mesh reinforcing for the pavement. The assemblies are similar, both types of joints having 1 x 18-inch round dowels across the slab on 12-inch centers. At the contraction joints the dowels pass through a ½-inch steel plate extending the width of the lane but with its top ¾ inch below the surface of the concrete. The expansion material has a ¾-inch-thick fiber strip impregnated with asphalt through which the dowels pass. The joint material is 8½ inches high, with its top ½ inch below the top of the slab. When the joint was set securely in place, supported by 3 or 4 pins driven into the ground on each side, a metal cap channel with 2½-inch lips was slipped over the top. This was not removed until after the finishing machine passed.

At the expansion joints, metal slip sleeves went over alternate dowels on both sides of the fiber. The portion of the dowel inserted in the sleeve was painted with bituminous material, while the rest of the metal was left bare. The subgrade around the joint was again checked with a scratch template, and wet down if necessary. The forms were oiled, and were then ready to receive the concrete from the paver.

Concrete Finishing

A MultiFoote 34-E single-drum paver with a 30-foot boom worked outside the forms on the first lane, and on top of the finished slabs on subsequent lanes. In the latter case the new concrete was protected by rubber-composition mats, wide enough to take the crawler treads of the paver. The paver also pulled along behind it a square metal plate that rested on the pavement under the concrete bucket. This caught any concrete that slopped over as the drum was discharged and that might have adhered to the newly paved lane.

As the paver discharged concrete between the forms, two pit men spread a little of it out along the forms or edges of adjoining lanes during operations on the second or third strip. They worked the concrete into the key groove to prevent any honeycombing; the concrete also gave support to the longitudinal bars, thereby preventing their being flattened out on the ground under the weight of the discharging concrete. A Jaeger screw-type spreader struck off



C. & E. M. Photo

Trucks receive loads of sand and stone, and cement, from Heltzel bins at the batch plant which Hempt Brothers set up for its Pennsylvania concrete-paving contract.

the concrete on a plane 2 inches below the top of the forms, and then backed up for the placing of the steel mesh reinforcement. More concrete was then added, and the spreader leveled it off even with the top of the forms.

No vibrators were used during the placing of the concrete, but a spade was worked along the sides of the forms in advance of a Jaeger-Lakewood double-screed finishing machine. After this

(Concluded on next page)

*The Sure Sign
of
Dependability*



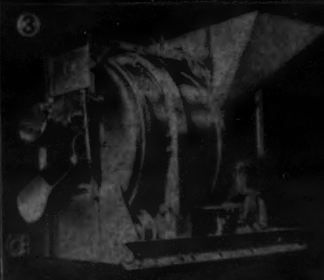
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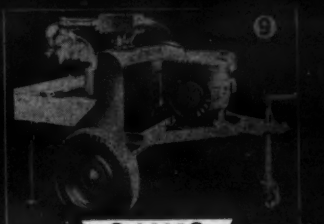
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JETCRETE GUN



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1. **CMC BIN BATCHER.** A great time saver. Two men can charge and operate an 11S or 16S mixer with this unit.
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9. **CMC RADIAL SAWS.** A complete portable, compact planing mill. With bench or complete trailer and generating set as illustrated.

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The JIFFY Stake Puller

*Different!
—Works like
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No more bending down to attach jaws to the pin by hand. . . . Attach by the handle . . . then an easy push downward lifts out the pin. Easy to operate. Pays for itself in a week. You get your forms ahead faster for resetting.

With a JIFFY Stake Puller you can drive pins flush with the top of your forms. This means better "strike-off" work and insures the best of concrete.

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CONSTRUCTION **M**ACHINERY **C**O.'S.



Big Paving Project On Lincoln Parkway

(Continued from preceding page)

machine had made two passes over the concrete, any irregularities that remained were removed by hand with a long-handle float. The float consisted of a 10-foot-long section of a 3 x 4, with a steel shoe on the bottom, fastened to a long handle. The surface of the concrete was then checked with a long-handle straight-edge. There was no longitudinal screeding of the fresh concrete.

Water Cure

The finishers removed any laitance from the surface with a strip of burlap pulled longitudinally over the slab; this also gave a final finish to the work. The caps on the expansion joints were removed, and the slots edged at both the expansion and contraction joints. When the concrete had acquired its initial set, it was covered with Osnaburg curing mats which were kept wet for 3 days. Then the mats were removed, though traffic was kept off the new pavement for 7 additional days.

Water used in curing the concrete was pumped from conveniently located creeks by a Jaeger 4-inch pump into an 800-gallon tank truck. The tank truck was equipped with a vertical spraybar forward of the tank and on the left side. The water was sprayed out of the bar through three nozzles, the pressure being supplied by a 2-inch pump mounted on the truck. With the truck moving at a rate of speed under 5 mph, the burlap got a thorough soaking at one pass.

The week after the laying of pavement, the joints were poured with asphalt. The average production was 1,500 linear feet of 11-foot-lane pavement in a 10-hour day.

Quantities and Personnel

The major items in the 4.9-mile highway contract included the following:

Excavation	168,600 cu. yds.
Special subgrade, 6-inch course	146,219 sq. yds.
Reinforced-concrete pavement, 9-inch	100,790 sq. yds.
Plain steel bars	98,331 lbs.
White concrete reflecting curb	8,916 lin. ft.

Hempt Brothers of Camp Hill, Pa., had a working force of 115 employees during the peak of the construction, under the direction of J. S. Anderson, Superintendent, and R. K. Grove, Assistant Superintendent.

For the Pennsylvania Department of Highways, the project was under the supervision of C. R. Forbes, District Engineer at Harrisburg. The Department is headed by Ray F. Smock, Secretary of Highways, and E. L. Schmidt, Chief Engineer.



Universal Engineering's new high-capacity plant combines on one chassis a new arrangement of a roller-bearing jaw crusher, hammermill, and gyrating screen.

Aggregate Plant On a Single Chassis

A combination plant for the production of road rock, stone chips, or agstone is announced by the Universal Engineering Corp., a division of Pettibone Mulliken Corp., 620 C. Ave., N. W., Cedar Rapids, Iowa. This high-capacity one-unit portable outfit is designed to do the work of two single crusher units. It is a new arrangement of three primary components — the Universal roller-bearing jaw crusher, the Universal roller-bearing hammermill, and the Universal Simplicity gyrating screen. Mounted on the same single chassis are the clutch-controlled folding conveyors, rotator, and necessary connections.

The plant is shovel-fed and can be moved to and from working positions about the job without dismantling. Provision is made to power the hammermill separately and so permit variable speeds to suit the nature of the rock being crushed and the kind of finished product wanted. The rest of the plant is driven from the crusher. Power is transmitted to the hammermill and crusher through special countershafts and universal joint connections. The plant features an anti-friction construction throughout.

The hammermill will receive stone up to 5 inches, and the jaw crusher may be set to whatever size is needed for proper balance with it. A large 3-deck gyrating screen with gates at the discharge end grades the crushed stone into one, two, or three sizes. The screen is equipped with a ball tray which serves as a fourth deck with coarse mesh wire when a high percentage of agstone is being made. The tray is divided into multiple compartments, each of which has several rubber balls. The gyrating motion of the screen causes these balls to beat against the bottom deck and keep the openings clear for top screening efficiency. This is especially valuable when working with materials which have a high moisture content.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 127.

Duff-Norton Sales Mgr.

James F. McCartney is the new Eastern District Sales Manager of The Duff-Norton Mfg. Co. He succeeds G. L.

Mayer, who has retired but who will continue with the company in an advisory capacity. The eastern district office is in New York City.

Uses for Diesel Engines

Diesel engines and their many uses are highlighted in a 16-page catalog prepared by the Caterpillar Tractor Co., Peoria 8, Ill. The catalog illustrates and describes a wide variety of applications for these engines, and notes several Caterpillar diesels which have hung up high life records.

Catalog No. 12109 points out several features claimed by the manufacturer for its diesels. These include dependability, toughness, long life, reliability, and economical and profitable performance. It is well illustrated with photographs of Caterpillar diesels in use in rock crushers, drill rigs, pumps, saws, dredges, shovels, compressors, etc.

This literature may be obtained from the company, or by using the Request Card at page 16. Circle No. 71.

VIBER SAVES TIME AND COST IN CONCRETE CONSTRUCTION

TESTS of NEW DESIGNS and DEVELOPMENT in VIBER EQUIPMENT PROVE INCREASED EFFICIENCY AT LOWER MAINTENANCE COSTS

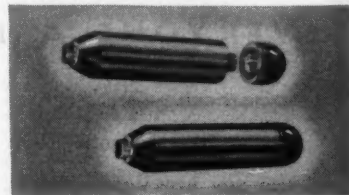


PX-6 EXTERNAL VIBRATOR EXTREMELY EFFECTIVE IN MANUFACTURE OF CONCRETE PRODUCTS AND HANDLING OF DRY MATERIALS

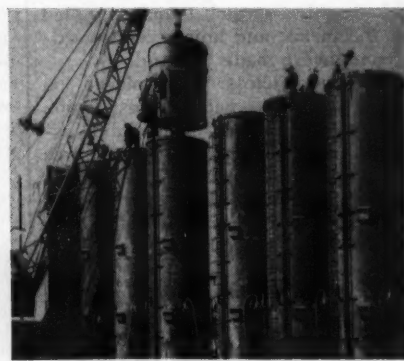
The proper balance of amplitude and speed over a wide range produces marked improvement in the manufacture of concrete pipe and greatly increases the life of the forms. Many placement problems have been solved by this new vibrator.

VIBER RUBBER TIPPED VIBRATORS REDUCE FORM DAMAGE

Damage to expensive form lining materials necessitating frequent form replacement was the reason for develop-



ment of Rubber Tipped Vibrators. Severe tests on many large concrete jobs



proved costly grinding due to damaged forms was greatly reduced. Another advantage of Viber's Rubber Tipped Vibrators is replaceable tip. Simply unscrew worn part and install new tip.

REVERSIBLE FEATURE PRACTICALLY DOUBLES THE LIFE OF CASINGS

Standard 6, 12 and 21 foot interchangeable Viber casings are reversible. Reversing is easily accomplished by unscrewing adapter and attaching it to the



other end. All cores are reversible. Viber casings are covered with durable, live, tire quality rubber.

For further information or descriptive literature on Viber equipment, please write Dept. 25

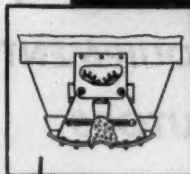
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GAR-BRO Standard Heavy Duty bucket, built in 6 sizes.

Patented double clamshell gates, non-clogging, self-closing, grout-tight.

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VIBER COMPANY Concrete Vibrators Since 1931
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This is the Model 727 of Osgood's new Type 72 excavator and material-handler. It can be used as a dragline, clamshell, or crane, and includes special features for levee work.

Excavator Machine Is Made in 3 Models

A newly designed Type 72 excavator and material-handling machine is announced by The Osgood Co., Marion, Ohio. Based on the Type 71 Osgood unit, the Type 72 has a capacity of $1\frac{1}{4}$ cubic yards and is available in three models: the Model 720, which can be used as a shovel, dragline, clamshell, crane, or backhoe, with all front-end attachments interchangeable; the Model 725, Mobilcrane, which can be used as a dragline, clamshell, or crane; and the Model 727 which can also be used as a dragline, clamshell, or crane.

Features of the Type 72 include an improved crawler unit with each tread belt controlled independently; the addition of Osgood hook rollers; heavy brackets supporting the rollers, mounted at each corner of the deck; and further stabilization of the superstructure on the crawlers through a gudgeon which is part of the crawler-base casting. The Type 72 is equipped with air control. The patented Air-Cushion clutches are designed to apply a metered air pressure to the working parts. And the patented Osgood rotary coupling takes the air pressure down through the vertical travel shaft to the steering clutches and brakes, without twisting or straining air pipes, the manufacturer states.

The Model 725 Mobilcrane is a one-man - operated one - engine machine mounted on a rubber-tired chassis. The independent travel unit is designed to provide one or two speeds forward and reverse, as desired. The Model 727 includes special features for levee and other dragline work, as well as clamshell and crane service.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 62.

Folder on Snow Plows

The freakish weather of last winter reemphasized the need to prepare for snow and to take winter equipment inventories well in advance, during the spring and summer months. A folder now being distributed by the Davenport-Besler Corp., 2305 Rockingham Road, Davenport, Iowa, describes a line of snow plows—the Davenport-Frink Snow-Plows. It explains that they will not wedge, that they have no side thrust,

that they make pushing easier, that they weigh less, that they bevel side banks, and that they are self-ballasting. These plows are available for mounting on trucks, motor graders, wheel and crawler tractors, and locomotives.

Several types of Sno-Plows are illustrated in the folder. They include the V-blade, straight-blade, reversible-blade, and straight-blade and V-blade units for light-duty use. The folder also illustrates the mounting mechanism for the plows.

This literature may be obtained from the company. Or use the Request Card at page 16. Circle No. 119.

V. P. for Marion Metal

W. H. Hammond has joined the Marion Metal Products Co., Marion, Ohio, as its Vice President in Charge of Sales. Assisted by Sales Manager Harold H. Jacobs, he will supervise all domestic and export sales activities. The company manufactures a line of dump bodies and hydraulic hoists.

GARRISON HYDRAULIC POWER STEERING INSTALLED ON NEW 100-HP No. 12 CATERPILLAR MOTOR GRADER

• Reduces steering effort to easy one-hand operation.

• Wheel lift and road shock eliminated.

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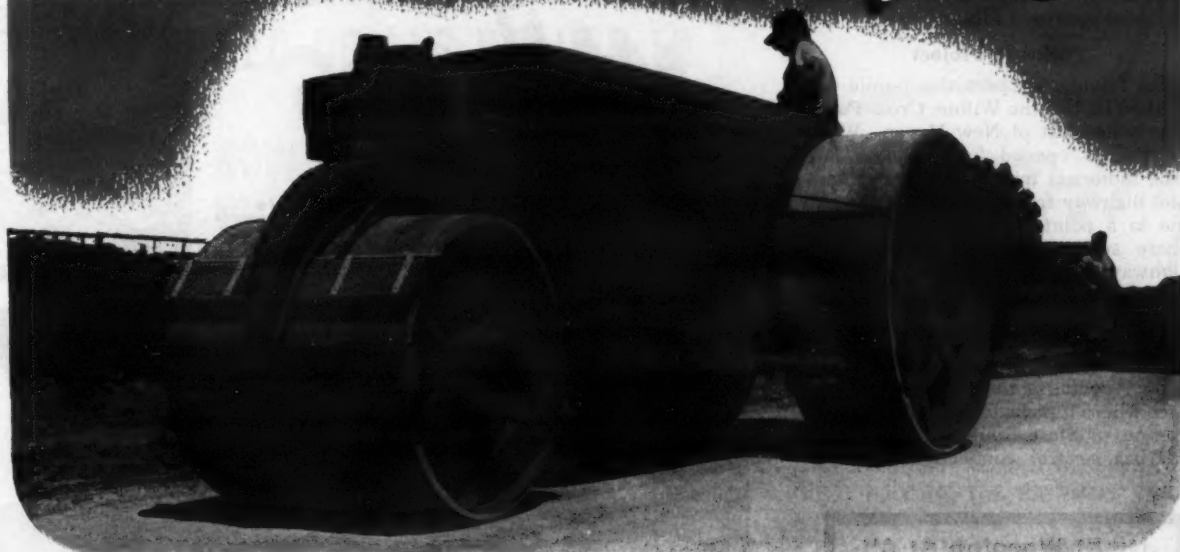
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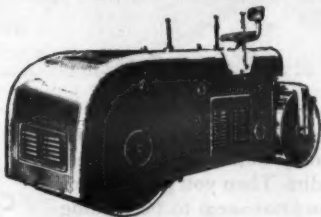
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or snow plow attachments.



HUBER TANDEM ROLLERS
5 Models - 3 to 14 Tons.



THE HUBER MFG. COMPANY
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**Then SEE HOW HUBER
3-WHEEL ROAD ROLLERS
CAN SAVE YOU MONEY!**

Today, you must do a comparable job, but for a lower cost! That means you must get more out of, not only your labor, but your equipment. Experienced road men familiar with Huber equipment say you can do just that! The practical design and rugged construction of Huber 3-wheel rollers places Huber owners at an advantage where low-cost operation is a factor. Huber rollers last longer... do more work during their life span... and do it so effectively that substantial savings, both on the job and maintenance-wise are effected. Huber 3-wheel roller features that mean savings for you include: "Stay-Put" front end design, fuel economy—either gasoline or Diesel power, heavy continuous steel frame without a bend, 3 speeds forward or reverse, hydraulic controls, fast acting triple-plate clutches and easy accessibility to working parts.

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Drill, Pavement Breaker and
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Twin Road Tunnels Bored Through Rock

1,200-Foot Tubes Driven To Carry Four Parkway Traffic Lanes Under Hill Near New Haven, Conn.

† CONNECTICUT'S first highway tunnel constitutes an important link in the state's parkway and expressway system. On completion, this system will extend over 100 miles from the New York border, in the southwest corner, to the Massachusetts line in the northeast portion of the state. The twin 1,200-foot-long highway tunnels on the Wilbur Cross Parkway are being constructed through the base of West Rock, a hilly prominence on the western outskirts of New Haven. The tunnels, each designed to carry two lanes of parkway traffic, were holed through in November, 1948. Both tubes are scheduled for completion by the end of this year, when the concrete lining and paving, tile facing, and ventilating features will be finished.

Construction began in March, 1948, after the Connecticut State Highway Department awarded a contract for the work to a partnership of the two firms of L. G. Defelice & Son, Inc., and Gull Contracting Corp., both of North Haven, Conn. Their low bid on the joint-venture tunnel project was \$1,934,203. The total roadway length of the job is 2,560 feet; this figure includes the east and west approach fills.

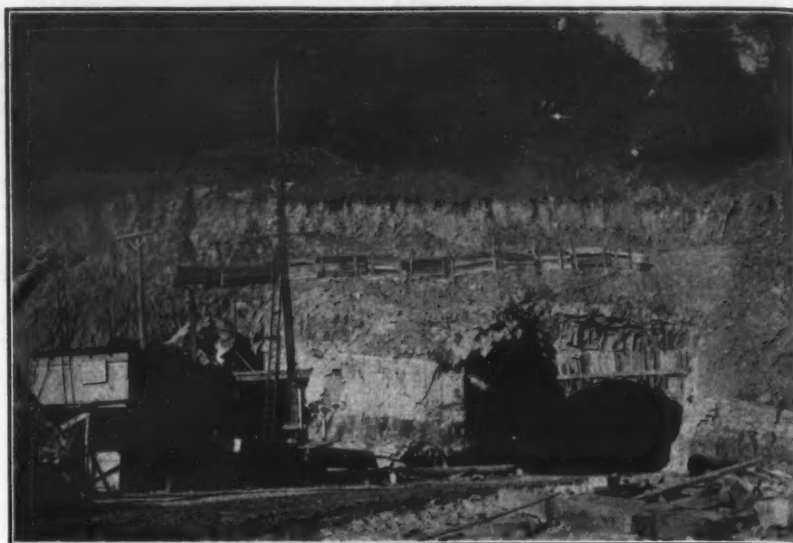
Parkway Project

The tunnels are part of a 7-mile unfinished link in the Wilbur Cross Parkway lying west of New Haven. When the link is opened for traffic in late 1949, motorists may ride on a modern dual highway from the New York state line to a point northeast of Hartford, where sections of the Wilbur Cross Highway were completed in 1948. Several projects are included in the link now under construction in the New Haven area. The parkway is being extended from its present terminal at Derby Avenue, or State Route 34, to the place where it picks up again at Dixwell Avenue, or State Route 10. While this link has several connections to New

Haven, it completely by-passes the heavily populated area of Connecticut's second-largest city.

But if it were not for the tunnel, this easy-flowing by-pass and well designed parkway alignment would not be possible. West Rock, a hilly ridge west of New Haven, lies squarely across the only logical parkway route. Alternative routes were possible but not feasible. The parkway could have been looped around the north end of the ridge, but this would have meant putting a hairpin in the alignment, and also adding 1½ miles to its length in constructing the route through Bethany Gap, a pass in the range of hills. If the route had been diverted to the south, the parkway would have had to cut

(Continued on next page)



C. & E. M. Photo

In this hilly ridge known as West Rock, west of New Haven, Conn., twin tunnels are being driven to carry Wilbur Cross Parkway traffic. It's the west portal you see here, and that's the blower house set up between the twin bores.



With hydraulically controlled loader in front, scarifier and scraper behind, this Model "VAI" Case tractor enables one man to do everything. He loosens, levels, spreads, digs, carries, lifts and loads earth—all with no need for other man or machine.

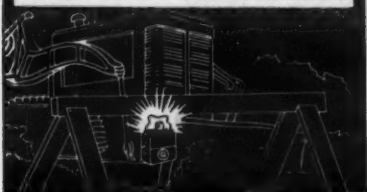
One man with Case "DI" tractor, shovel loader and dig-and-carry scraper (below) made 8-foot cut, finished 1000-yard job in 4 days. In larger picture, a Case "DI" equipped with hydraulic loader handles the backfill on a sewer job.

MAN SAVERS

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ELECTRIC
FLARE**

Night wrecks and accidents caused by hazards and barricades can be averted by warning lights and emergency flares. There are a thousand such uses for the Big Beam Electric Flare with red Fresnel lens. Dependable in any weather, set or hang anywhere in any position, knocking over will not interfere with its operation. A flip of the switch gives the choice of either a steady or a flashing flare. Interchangeable clear Fresnel lens converts it to a regular lantern. As easily serviced as a flashlight.

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● When you first put a Case Industrial tractor on an earth-moving job you'll notice how capable it is. You may think it uncanny that a tractor so compact can handle so much dirt. Then you get the idea that it's comfortable. Both tractor and operator seem to be "taking it easy."

As time goes on, you find that Case industrial tractors are economical, too. Their fuel economy continues consistently. More important in the long run, they are easy on upkeep. They take little of minor attention, go a long time before needing major overhaul. This same ENDURANCE means steady work on the job, makes the most of operating man-power.

Extra strength and stability built into Case Industrial tractors make them the ideal power plants for mounted equipment. The lugging ability of their heavy-duty engines makes hard pulls seem easier, saves gear shifting. Four basic sizes cover a weight range from 2500 to more than 10,000 pounds. J. I. Case Co., Racine, Wis.

Complete, Competent Service

Your Case industrial dealer is located to serve you conveniently, staffed and equipped to serve you well. Besides Case tractors and engine units he offers related equipment such as tractor-mounted loaders, mowers, snowplows, sweepers, bulldozers and scrapers. Specializing in the power and equipment problems that prevail in your area, he has broad experience that can be helpful to you.

CASE

through thickly settled New Haven suburbs and would have required much valuable right-of-way, high fills, and costly grade-elimination structures. If the present alignment had been held, but open cut substituted for the tunnel construction, more right-of-way would have been required, the rock-excavation item would have been tremendous, high approach fills would have been necessary, and steeper grades would have been part of the design.

So the tunnel route was considered the most economical in the long run. The New Haven Park Department granted the State Highway Department a right-of-way easement through West Rock. Maintenance costs with the tunnel are expected to be less than with any of the alternative routes under consideration. Furthermore, the city may be easily reached via several connecting routes from the near-by through parkway.

At the lower end of the 7-mile parkway link still under construction, the joint-venture firms of L. G. Defelice & Son, Inc., and Gull Contracting Corp. are also grading a section which begins at Derby Avenue or State Route 34, and reaches nearly to State Route 67. Bridges to carry the parkway over State Routes 67, 69, and the West River are being built by D. V. Frione Co. of New Haven. Then the tunnel and approach contract begins, and continues nearly east to Wintergreen Avenue where a grade-separation structure is being built by the Brunalli Construction Co. of Southington, Conn. From this bridge to Dixwell Avenue or State Route 10, a parkway section is being handled by D. V. Frione Co. The remainder of the parkway link from Dixwell Avenue to Whitney Avenue or State Route 10A was completed in December, 1948, by the Gammone Construction Co. of Providence, R. I. At this eastern end of the project, the Mariani Construction Co. of New Haven erected several grade-separation structures. From Whitney Avenue, the Wilbur Cross Parkway or State Route 15 extends to Meriden where it joins U. S. 5 and, as State Route 15, continues northward to Hartford, the state capital, and beyond.

Twin Tunnels

The twin 1,200-foot tunnels are located about midway of the 2,560-foot contract, with approximately half of the approach fill on each side. They are located on a nearly east-west line, with their center lines 63 feet apart. The tunnels slope upward from west to east on a 3 per cent grade. Each tunnel will carry two lanes of traffic on a 23-foot roadway. The roadway will be flanked on each side by a 2-foot 6-inch concrete curb walk, making the width of the tunnel 28 feet from wall to wall.

The walls are vertical. At the sides they afford a 14-foot clearance which increases to 18 feet 6 inches at the top of the arch in the center of the tunnel cross section. The top center of the arch is a true ellipse which is joined to the vertical sides by compound curves.

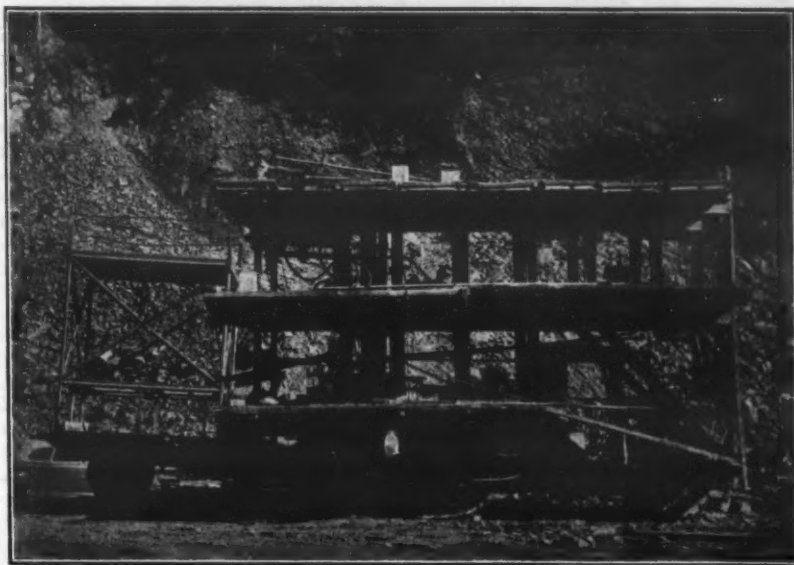
While no paving for the approach fills is included in the contract, the work on the tunnel itself calls for complete construction. The paving consists of an 8-inch reinforced-concrete slab supported on a 6-inch crushed-rock and sand

base. Each tunnel pitches to one side at the rate of $\frac{1}{8}$ inch to the foot. Beneath the base course, running along the low side of the tunnel, is a 15-inch concrete pipe for drainage. At 30-inch centers along the low side of the roadway are strainers, with 4-inch cast-iron pipe connectors running to the 15-inch drain.

Despite the hard nature of West Rock (it is primarily basaltic or traprock) the contractors installed steel ribs throughout the length of both tunnels. Made of 8-inch sections, these steel supports are left in place while the tunnel is lined with 12 inches of concrete. The side-wall and arch portions of the bores are filled with concrete to the cut lines. The vertical walls are faced with 2-inch tile to a height of 8 feet. Ventilating and lighting will be the last of the construction features to be installed.

Portal Work

The north tunnel will carry west-bound traffic, and the south tunnel the east-bound traffic. Over the north tube (Continued on next page)



C. & E. M. Photo

A Linn Mafrak mounts this three-platform drill carriage—one of two used to drill the Wilbur Cross Parkway tunnel through West Rock.

TOOL LIFE INCREASED

300%

—reports farm equipment manufacturer*



REAMERS REAM 400 HOLES INSTEAD OF 4!

—says machinery manufacturer*



HIGH SPEED DRILLS DULLED IN 30 MINUTES... NOW WORK 90 HOURS BEFORE RESHARPENING

—states machine tool manufacturer*



HI-SPEED-IT DID IT!

The actual on-the-job reports typify what hundreds of users say about *Hi-Speed-It*, the new steel hardening compound that hardens carbon and high speed steel tools and parts in a matter of minutes, and requires no baths, furnaces or special equipment of any kind.

In the standard procedure, illustrated below, *Hi-Speed-It* produces exceptional case hardness

but with this vital difference—that there is a gradual change in hardness beneath the surface, producing a tough backing for the case. Your naked eye shows this "root" structure extends at least $\frac{1}{16}$ " into the metal. By repeated treatment, any depth of hardness can be obtained.

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Heat tool or part to be hardened in torch, forge or furnace to cherry red color (1400° to 1700°F).



Immediately dip, stir or roll object in can of *Hi-Speed-It*.



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Reheat to cherry red until fusing is complete.



Quench quickly in clean, cold water or brine.

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Hi-Speed-It is a steel catalyst containing activated carbon made under Wilson Carbon Company, Inc. patent. Contains no cyanide or other producers of toxic fumes.

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Twin Road Tunnels Bored Through Rock

(Continued from preceding page)

lies 200 feet of rock, while 150 feet is the maximum overburden on top of the south bore. Elaborate portals have been designed for both gateways of the tunnels. They consist of concrete walls faced with pink granite masonry. The contractor began work at the west portal, since the low ends of the tunnels are on that side. This kept a head of water from accumulating in the working face as it would have if the digging had been from east to west. Also, about 85 per cent of the tunnel excavation went in to the fill on the west approach, so the hauling was simplified by starting operations at the west portal.

The contractor had a choice of driving sheeting at the portal for the construction of the walls, or stripping the loose shingle stone at the face, building the walls, and then replacing the stone. He elected the latter method since the stone that was pulled down provided a working platform at the west portal for the tunnel-driving equipment. A shortage of reinforcing steel for the concrete portal walls postponed this phase of the construction until the 1949 season. Some sandstone formations at the portal made the excavation somewhat easier than in the tunnel proper, where the harder traprock prevailed throughout.

At both ends of the tunnel there were some cut and cover sections. In the north bore, the cut and cover extended 70 feet at the west end and 85 feet at the east end. In the south half, the west and east cut-and-cover sections were 105 and 145 feet long respectively. Thus, although the tunnel was bored from west to east, a rock crew was also kept working at the east end, clearing the portal and establishing a heading on that side. Surplus muck from the excavation was stockpiled at the east end and later hauled through the completed tunnel for disposal on the west approach fill.

Tunnel Procedure

Work in both tunnels was pushed simultaneously, and progress at the two headings was generally kept at about equal distances from the west portal. Driving operations were handled by two crews—one to drill and blast, the other to scale, muck, and set the supporting steel. A day's work consisted of two shifts—the first from 6:00 a. m. to 2:30 p. m., and the second from 2:30 p. m. to 11:00 p. m., with a half hour for lunch during each shift.

The typical procedure was to have the drilling crew drill and fire a round in one tunnel while the mucking crew was excavating the blasted rock from the other tunnel. Then the crews shifted places and drilling was continued in the second tunnel while the first tunnel was being mucked. The two operations usually balanced out in good style, but at times the muckers worked from 1 to 3 hours overtime at the conclusion of the last shift in order to have one tunnel ready for the drillers by 6:00 a. m. the following workday.

At the beginning of the work, a 4-foot round was drilled; this was soon increased to 8 feet and finally to 13 feet. The latter depth of holes resulted in an average pull of 11 to 11½ feet, which was achieved in both headings every day. For every linear foot of advance in each tunnel, the average excavation to pay lines was 23.85 cubic yards. And for every yard of muck excavated, 2.3 pounds of Hercules Gelamite 2X dynamite was required to blast it loose.

In the early stages of the tunnel excavation, the steel ribs were set on first 2-foot, then 4-foot, and finally on 6-foot centers. This last spacing was maintained over practically the length of both tunnels. The 8-inch supporting ribs were shipped to the job from the Commercial Stamping & Shearing Co. of

Youngstown, Ohio. The vertical members were erected on footings made of 4x10 timber sections, while the arch pieces were bolted in place from the drill jumbo. Heavy 3x10 lagging was stretched lengthwise on top of the ribs to serve as a tunnel roof and keep rock from falling into the tunnel. Any questionable places in the rock periphery were well blocked and shored with heavy timbers braced against the ribs. Timbers were cut out in the carpenter shop on a Superior Super Woodworker 22-inch table saw.

Rock Drilling

To drill these wide 28-foot tunnels, two drill carriages or jumbos worked side by side against the face of the heading. Each jumbo consisted of a

Linn Haftrak on which was erected a system of steel I-beam columns supporting timber-plank platforms at three different levels. On these platforms, 4-inch-diameter column shells or pedestals were set up vertically to hold the Ingersoll-Rand DA 35 water-line drifter drills. Each jumbo held 7 drifters—1 at the center of the top platform, 2 each on the next two lower platforms, and 1 each at the sides, just above the ground, mounted on a 4-inch hollow-steel pedestal. With these 14 drifters on the two jumbos, the entire face of the heading was easily reached.

With the drifters, 1¼-inch drill steel was used in 3, 6, 10, and 13-foot lengths. At the beginning of the job, conventional rock bits were used, but only from 3 to 5 inches could be drilled

per bit in the tough traprock. A change was made to I-R Carboly 2½-inch bits which were good for 150 feet of rock per bit. From 60 to 85 holes were drilled for a blast, using up to 9 delays. Generally 4 holes with No. 1 delays were drilled at the center of the face to make a wedge cut. These 4 holes were sloped towards the center and laid out to form a rectangle about 8 feet wide and 2½ feet high.

Beyond the center cut were No. 2 delays on about a 3-foot spacing, and then the remainder of the delays on varied centers. The lifters at the bottom and the liners along the roof were generally No. 9's, with No. 7's or No. 8's along the sides. The side holes had an average vertical spacing of 2½ feet, while the

(Continued on next page)

Standardize and



STANDARDIZED EQUIPMENT

Two "matched teams" of "Caterpillar" DW10 Tractors and W10 Wagons working on well-timed schedule with a "Caterpillar" Diesel-powered shovel on the Cincinnati Freeway project.

"**MONEY** saved is money made" is an old saying that makes a lot of sense. Shrewd contractors make it one of their most valuable guides to profit. The DeSalvo Construction Co., of Cincinnati, is one of them.

Says A. DeSalvo, Vice-President: "We learned the hard way—through experience with jumbled equipment that was often expensive. But today **WE'RE NOT GUESSING** when considering our requirements for important earthmoving projects. We've found that all 'Caterpillar' equipment—made entirely by one high-caliber manufacturer and serviced by one thoroughly equipped dealer—offers the surest means for saving and making money.

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high availability time per hour. They plainly showed that they are specially designed to work together; and their performance in every way justifies our continued confidence in 'Caterpillar.'"

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EARTHMOVING EQUIPMENT

roof and bottom holes averaged 3 feet on centers. All holes were charged. The distribution of dynamite in a typical 69-hole charge was as follows:

Delay No.	Number of Holes	Sticks of Dynamite
1	4	60
2	6	90
3	2	30
4	2	30
5	2	60
6	2	75
7	5	30
8	10	66
9	31	148
Total	69	301

Of the 31 holes using the No. 9 delays, 13 were double-charged.

Tunnel Equipment

Compressed air for the drifters was supplied at 100-psi pressure by a battery of 6 Ingersoll-Rand compressors—

2 at 315 cfm and 4 at 500 cfm. They were housed under a wooden lean-to just outside the west portal of the tunnel, and they pumped the air into a steel cylindrical receiver 20 feet long x 10 feet in diameter. From the receiver a 6-inch steel pipe line carried the compressed air into the tunnels up to the jumbos.

Water for the 14 drills was brought into the tunnels through a 2-inch pipe that fed a reserve water tank on the jumbos. City water was used; it was tapped off an extended main and pumped into the tunnels by an electric pump. With the 3 per cent grade, no water pumps were needed in the tunnel. Seepage was negligible anyway. The only water came from the drifters, and this quickly ran off.

Electricity for the job was obtained by tapping a near-by 2,300-volt line, and stepping down the current with transformers set up at the west portal. A 110-volt light line went up to each heading, also a 240-volt shooting line. At the beginning of the job, the regular light reflectors were getting shot up so frequently by the blasting that the contractor replaced them with ordinary aluminum kitchen pans. A couple of light bulbs were placed in each pan. This arrangement gave satisfactory results; the aluminum pans had good reflecting qualities, and also withstood the flying rock very well.

Into both tunnels ran 30-inch metal ventilating lines which came together outside the west portal to form a Y. At the base of this Y was a Roots-

Connersville blower. On each side of the main blower was a Sturtevant auxiliary blower that was connected to the 30-inch air line nearest it. With this ventilating system the foul air was speedily sucked from the tunnel after a blast. Then the system was reversed, and fresh air was blown into the heading. Most of the time the big fans were blowing air into the tunnel rather than exhausting the air. The main blower ran off the 2,300-volt line, while the auxiliaries operated on 440-volt current.

Mucking

After the face holes had been drilled, the two jumbos pulled out of that tunnel, backed into the adjoining tunnel, and began drilling operations there. In the meantime, the holes were charged and blasted, and the bad air was sucked from the heading. As soon as the blowers began blowing fresh air back into the heading, mucking operations got under way.

The rock was picked up by a Lorain 78 shovel equipped with a 1½-yard bucket. The boom and stick of the shovel were cut down to 15 and 14 feet respectively so the rig could work smoothly right up in the heading as it loaded rock into Koehring 6-yard Dumpsters. Three of these trucks were used during the mucking, and they hauled the rock an average of 1,100 feet to the west approach fill. There it was dumped, then spread in layers by a Caterpillar D8 tractor-dozers. The dozer also worked in the tunnel with the shovel, pushing the muck up into piles for easier handling.

As the mucking progressed, miners working from a platform truck or from the ground scaled down any loose rock with long rods. The steel ribs were erected, first the side members and then the arches; the latter were set up with the help of the jumbos which were brought back into the tunnel. An average of 43 men was employed on each tunnel shift. A crew consisted of a foreman, 14 drillers, 14 chuckers, 5 laborers, 3 miners for scaling, 3 truck drivers on the muck trucks, a shovel operator, dozer operator, and oiler.

While the tunnel driving was in progress, construction was not idle around the east portal. Excavation for the cut-and-cover sections through the rock kept moving along, a heading was established, and rock was scaled down for the wall portals. Four I-R wagon drills powered by four I-R 315-cfm compressors were used on the rock work. The rubble was loaded by a Northwest 1½-yard shovel into 3 Mack 4-yard trucks, and either disposed of on the east approach fill, or stockpiled for use later on the west approach. A D7 dozer worked around the shovel or on the fills.

Ventilating Shaft

After the twin tunnels were holed through on November 9, 1948, digging began on a shaft for the permanent ventilation of the tunnel. This shaft is located about halfway through the tunnels, and fits in the space between the two tubes. It measures 180 feet deep from the house on top of West Rock, which will act as a weather hood, to the roof of the control room in a cross passage connecting the twin tunnels. The shaft itself will be 16 feet square.

First a well-drilling rig dug a 6-inch hole the full depth of the shaft. Then a cable was dropped through this hole to support a 7-foot-square working platform from which two drillers operated Gardner-Denver stopper drills. They drilled and blasted an 8-foot-square pilot shaft from bottom to top, and then enlarged the opening to 16 feet square by drilling and blasting into the side walls. Since they worked from bottom to top, the muck was easily handled; it dropped to the bottom of the shaft after a blast, and from there it was shoveled up and hauled out of

(Concluded on next page)

Economize



STANDARDIZED SERVICE—Headquarters of the "Caterpillar" dealer whose modern facilities and factory-trained mechanics enabled the DeSalvo Company's "Caterpillar" equipment to keep its job on the Cincinnati Freeway project moving.

STANDARDIZED EQUIPMENT

A "matched team": A "Caterpillar" D8 Tractor and No. 80 Scraper making medium-haul cuts and fills on the Cincinnati Freeway.

STANDARDIZED EQUIPMENT

Two "matched teams": A "Caterpillar" D8 Tractor and No. 8S Bulldozer and a DW10 and W10 Wagon collaborating on hauling-and-spreading on the Cincinnati Freeway.

STANDARDIZED EQUIPMENT

A "Caterpillar" No. 12 Motor Grader maintaining road for "Caterpillar" earthmoving equipment . . . another example of "matched team" work on the Cincinnati Freeway project.

Twin Road Tunnels Bored Through Rock

(Continued from preceding page)

the tunnel.

The permanent ventilating system will consist of two fans for each tunnel, located in the cross tunnel at the foot of the shaft. The fans are 72 inches in diameter, and each has a capacity of 82,500 cfm. They will exhaust the air from the tunnels and blow it up the shaft, which will be provided with four separate flues to prevent the air from short-circuiting from one fan back through another fan to the tunnel. The operation of the fans will be automatic, controlled by a carbon-monoxide detector system which will start a fan working in a tunnel when 2 parts of carbon monoxide in 10,000—or some other predetermined air content—has been reached. As the carbon-monoxide content increases, the other fans will be switched on; and as the air is purified, the action of the fans will then be stopped.

The tunnel lighting system has been designed to meet both day and night conditions, with luminaires located on the center line of the ceiling throughout the length of the tunnels. For general illumination, 300-watt luminaires are spaced on 30-foot centers beginning 20 feet inside the ends of the tunnels. These provide 2 foot-candles of light on the roadway. All the luminaires will be turned on during the daytime, but at night every other one will be turned off by a time clock.

Quantities and Personnel

The major items of the \$1,934,203 tunnel contract are as follows:

Portal excavation	29,150 cu. yds.
Tunnel excavation	51,300 cu. yds.
Shaft excavation	1,560 cu. yds.
Steel arch ribs, sills, and columns	365,000 lbs.
Concrete tunnel lining	8,820 cu. yds.
Concrete shaft lining	820 cu. yds.
Concrete in portals	2,950 cu. yds.
Deformed steel bars	673,000 lbs.
Broken stone for base	2,870 tons
Concrete for pavement	1,380 cu. yds.

Some time this year the contractor will set up a concrete batch plant for the lining and wall work. Steel forms will be used for the lining, and a Pumpcrete machine will place the concrete. The steel reinforcing is supplied by the Sparrows Point, Md., plant of the Bethlehem Steel Co.

For the joint-venture firms of L. G. Defelice & Son, Inc., and Gull Contracting Corp., James Grillo is supervising



C. & E. M. Photo

A Koehring Dumptor unloads tunnel muck on the Defelice and Gull joint project.

the work in the role of Superintendent. Dave Parker and William Jones are Night and Day Foremen respectively.

Walter Maynard is Project Engineer for the Connecticut State Highway Department. The Department is headed by G. Albert Hill, Commissioner, with R. E. Jorgensen, Deputy Commissioner and

Chief Engineer. Warren M. Creamer is Director of Engineering and Construction, and M. A. Tyack is Engineer of Contracts and Construction.

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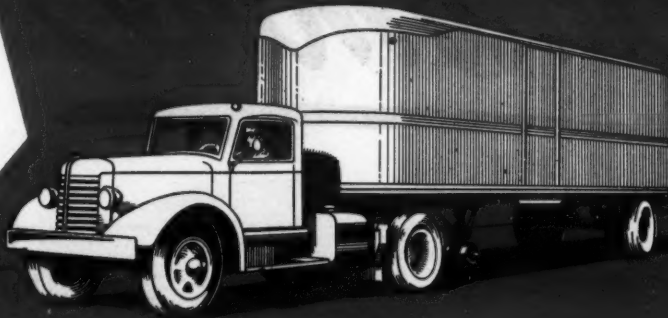
Breaker for Concrete

A high-speed wheel-mounted pavement breaker is the subject of a folder issued by the R. P. B. Corp., 2751 E. 11th St., Los Angeles 23, Calif. The folder features a list of specifications for the Mighty Midget, including the working stroke, working speed, vertical movement of the cylinder, steering mechanism, wheels, brakes, bearings, and dimensions and weight.

The folder illustrates and describes seven tools for use with the Mighty Midget: the square tool for making a cut along the center line of a concrete trench, the concrete scoring tool, asphalt scoring tool, asphalt edging tool, ball tool for general demolition work, tamping pad, and flat tool for breaking thin concrete sections. Four photographs, with captions giving job details, show the Mighty Midget in use on high-speed breaking operations.

This literature may be obtained from the company, or by using the Request Card at page 16. Circle No. 64.

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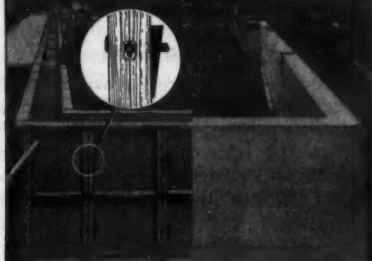


Not much, you may think. But, if you consider that those 28 pounds of DEADWEIGHT might have been carried 300,000—400,000 or 500,000 miles needlessly, QUITE A LOT! Why make your trucks haul unnecessary, non-profit-earning DEADWEIGHT that reduces the PAYLOAD part of their legal gross poundage? MECHANICS Roller Bearing UNIVERSAL JOINTS Truck PROPELLER SHAFTS are made 34% lighter, run smoother and place

much less load on transmission and pinion bearings—without loss of torque. Let our engineers help add to the ton-mile capacity of your trucks by specifying weight-saving MECHANICS Roller Bearing UNIVERSAL JOINTS Truck PROPELLER SHAFT applications.

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This improved model of the Power Cart has a 7-hp 4-cycle gasoline engine which enables it to climb 20 per cent grades with a 2,000-pound load.

Power Concrete Cart Has a 7-Hp Engine

An improved Power Cart is announced by the Gar-Bro Mfg. Co., 2416 E. 16th St., Los Angeles, Calif. The new model has a 7-hp 4-cycle gasoline engine and is designed to go up an incline of 20 per cent carrying a 2,000-pound load. All moving parts are equipped with Timken tapered roller bearings. The forward and reverse clutches have been improved to provide additional life and smoother operation; and the frame has been made stronger without additional weight.

The Power Cart is steered by a tiller which turns the rear wheel through a 180-degree arc so the machine can turn in a 4-foot radius. The tiller also controls forward and reverse motion. Speeds of up to 10 mph are controlled by a foot throttle. The carrying tray is designed so that the load is balanced and the operator can control the dump. The bulk of the load is carried by the large front wheel.

The cart is constructed of all-electric-welded steel plate and tube. It is 85 inches long and 39½ inches wide, and will side-dump on a standard 5-foot runway. It has a loading height of 31 inches and will carry 9 cubic feet of material. When it is equipped with side boards, its carrying capacity is increased to 12 cubic feet. A mechanical foot brake and foot-operated tray-release latch are standard equipment. The unit weighs 685 pounds, empty.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 57.

Hard-Facing Alloys

A complete new line of hard-facing alloys is announced by the Air Reduction Sales Co., 60 E. 42nd St., New York 17, N.Y. Developed to combat abrasion, impact, heat, and corrosion, the alloys are divided into three primary groups—ferrous alloys, cobalt-base alloys, and tungsten-carbide alloys.

The Aircolite alloy is especially recommended by the company for equipment subjected to severe abrasion and medium impact, such as pulverizer hammers and core-crusher rolls. It can be used for oxyacetylene or electric-arc application. The Airco self-hardening alloy is for equipment subjected to severe impact as well as abrasion—for example, bucket teeth and sizing screens. It is made for electric-arc application.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 73.

Ray Johnson Joins Meadows

T. R. Johnson has joined W. R. Meadows, Inc., as General Sales Manager. He will make his headquarters at the company's main offices in Elgin, Ill. Mr. Johnson was formerly Sales and General Manager of the Keystone Asphalt Products Co.

W. R. Meadows, Inc., manufactures the Sealright line of paving and building products. The company has added

to its line of expansion joints and asphalt planks some new products including pre-formed center strip, dummy joints, base plate, and curing compounds. It is also producing backer board, asphaltic waterproofings, caulking compounds, and asphalt paints.

Feature of Trailer Line

Is Removable Gooseneck

Specification sheets for its line of heavy-duty trailers have been prepared for distribution by the Talbert Construction Equipment Co., 7950 W. 47th St., Lyons, Ill. The feature of these trailers is a cable-operated removable gooseneck designed to permit front-end loading.

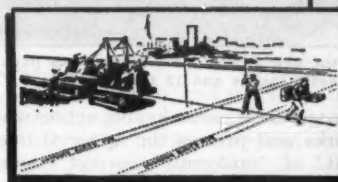
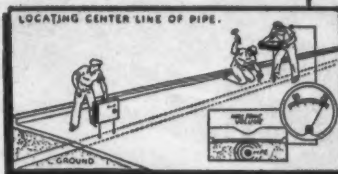
Catalog sheet No. 102 lists 10 trailers in a capacity range of 10 to 75 tons. It covers their brake diameter and width, size of tires, distance from the back of the gooseneck to the front of the rear bridge and to the rear of the trailer, road clearance, deck height, width, overall length, and weight.

These trailers are made in single and tandem-axle drop-deck models.

Another catalog sheet, No. 101, concentrates on the features and operation of the removable gooseneck. It also discusses the electrically welded all-steel frame of the trailer, the Hendrickson Tandem Assembly with springs, its

Bendix-Westinghouse air brakes, clearance lights, oak flooring, and simplified tire changing.

This literature may be obtained from the company. Or use the Request Card at page 16. For Bulletin 102, circle No. 124; and for copies of Bulletin 101, circle No. 125.



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Rock-Crushing POWER

AT ROCK-BOTTOM COST

Ada County's Universal No. 880 Master gravel plant with 24" twin dual roll crusher and No. 1024 jaw crusher, powered with a 6-71 GM Diesel engine.

Here's a rock-crushing plant that produces up to 200 three-yard truck loads a day using only 45 gallons of fuel in 8 hours. It's owned by Ada County, Idaho, and it is powered with a 6-cylinder General Motors Series 71 Diesel.

In applications like this, all over the country, these rugged 2-cycle GM Diesels are getting more work done—and getting it done for less cost. With power at every downstroke, they deliver a sturdy, dependable flow of power. They're smooth, easy to start and quick to adjust to varying load demands.

As for upkeep—it is always low because of the clean, simple design and precision manufacture found in GM Diesel engines. They are built to "take it" on tough jobs like this—are given rigid "run-in" tests. Then too, they are backed by Detroit Diesel's well-known owner service policy and the ready availability of factory engineered replacement parts.

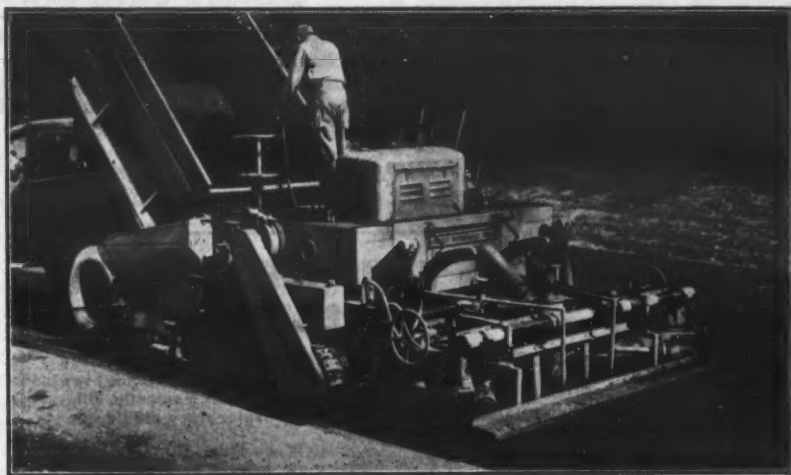
All this makes a GM Diesel a natural for any job you may have. It's an engine you'll want to learn about, so write today for the complete story.

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SINGLE ENGINES... Up to 200 H.P. DETROIT 28, MICHIGAN MULTIPLE UNITS... Up to 800 H.P.

GENERAL MOTORS





Without the removal or insertion of any parts, the new Jaeger BP-5 bituminous paver lays various widths of paving between 5 feet 8 inches and 12 feet 6 inches.

Paver Is Adjustable For Varying Widths

A bituminous paver for various widths of paving between 5 feet 8 inches and 12 feet 6 inches is announced by The Jaeger Machine Co., 701 Dublin Ave., Columbus 16, Ohio. The BP-5 is designed to lay these widths without removal or insertion of any parts, and to lay a 25-foot pavement in two lanes without special attachments.

Width settings at 5 feet 8 inches is effected by blocking of plates. Widths from 7 feet 4 inches to 9 feet are made by use of a block-off plate and hand wheel. From 9 feet to 12 feet 6 inches hand wheel control only permits instantaneous adjustments without stopping the machine. This is especially advantageous for road widenings caused by curves.

A hydraulic device automatically matches the level of course being laid with the adjacent course, curb, gutter, or other grade line, says Jaeger, and thus maintains the correct thickness for final roller compaction.

The machine is also able to pave flush to curbs and to insure blended and sealed joints between adjacent lanes. It will lay a mat thickness up to 6 inches, the manufacturer states, with precision-smooth surface. The long straight-edge equalizing runners and automatic hydraulic leveling pans hold the rear screed to the level established by the center screed.

The center and rear screeds oscillate at 900 strokes per minute, and have beveled front edges which are V-grooved in the direction of travel. They

are said to impart a keying action which works and presses the material into a mat of uniformly correct density throughout its width and thickness, and which does not bring fines or bitumen to the surface or spall surface aggregates. Raising the trailing edge of the screed reduces the accumulation of fatty material. Quick crown changes ranging from 2 inches convex to 1 inch concave are achieved by cranks located on the screeds.

Crawler tracks support all the weight of the paver except that of the screeds and the equalizing runners, which ride on the base course or the subgrade. Since the weight of the machine is never on the material being laid, there is no premature sealing of material that requires aeration. The 6-ton hopper holds an ample supply for continuous operation. Material is carried from the hopper to the screeds by dual conveyors independently and closely controlled through hydraulic clutches. An agitator-distributor breaks up, re-fluffs, and spreads the material evenly across the center-screed width, Jaeger points out. Material channels at both sides provide material for the rear screeds. The screeds are heated by hot air and have hydraulic lifting devices.

The BP-5 paver offers eight working speeds ranging from 5 to 50 fpm, and road speeds of from 0.6 to 2.0 mph. The machine is powered by a 6-cylinder gasoline engine rated at 37.5 hp at 1,600 rpm, and is equipped with a throttle and governor control. It can be used to lay hot or cold material of dense or open texture.

Further information may be secured

from the company. Or use the Request Card at page 16. Circle No. 56.

Caterpillar Announcements

Robert J. Loskill has been named Assistant Manager of the Governmental Sales Division of the Caterpillar Tractor Co. He is succeeded as District Representative in the Central Sales Division by B. N. Martin, formerly District Representative in North Dakota and Saskatchewan. Distributors in Mr. Martin's new territory include Missouri Valley Machinery Co., Lincoln Equipment Co., and Nebraska Machinery Co.—all of Nebraska—as well as the McCoy Co. of Denver, Colo.

Edward L. Malec has been named District Representative to contact Halladay-Dettman Co., S. Dak.; Dakota Tractor & Equipment Co., Fargo, N. Dak.; and Kramer Tractor Co., Ltd., Regina, Saskatchewan. M. H. Morsbach will continue to represent the company in contacts with Roberts Tractor Co., Inc., Dodge City, Kans.; Foley Tractor

Co., Wichita, Kans.; The Oehlert Tractor & Equipment Co., Inc., Salina, Kans.; Martin Tractor Co., Inc., Cedar Rapids, Iowa; and Southwest Machinery Co., Oklahoma City, Okla.

Gibbs-Cook Tractor & Equipment Co., Des Moines, Iowa, which was formerly contacted by Mr. Loskill has been added to the territory served by J. M. Abbey. Mr. Abbey also contacts Wm. H. Ziegler Co., Inc., Minneapolis, and Powell Equipment Co., Ltd., Winnipeg, Canada.


Caterpillar also announces that a new parts depot, to facilitate shipments to dealers and customers, is under construction in Indianapolis, Ind. Parts will be stocked for diesel track and wheel-type tractors, diesel engines, diesel motor graders, and other Caterpillar earth-moving equipment. The depot will serve distributors in Indiana, Illinois, Wisconsin, Michigan, Iowa, Missouri, Kentucky, Ohio, Tennessee, Pennsylvania, West Virginia, Virginia, and Maryland, in addition to Ontario and Quebec, Canada.

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Every "QUICK-WAY" part will deliver its capacity rating and more, and you get more utility out of a "QUICK-WAY" fully equipped, than any comparable equipment. Each "QUICK-WAY" is easily converted in minutes from shovel to crane, dragline, clamshell, pile driver, scoop, trench-hoe or backfiller. Buy just the attachments you want to do more jobs better.

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Road Bidder Gambles But Rippers Pay Off

Geological Long Shot Played by Contractor As Competition Plans To Drill and Shoot

A LONG-SHOT gamble on rock, played by a western contractor, was one of the most interesting features of a new 5-mile grading and paving job on U. S. 40, from Oasis to Pequop Summit in Nevada. The \$600,000 low bid of Gibbons & Reed of Salt Lake City left a sizable sum "on the table", but the excavation of long, deep rock cuts by rippers and tractor equipment has pulled the job towards completion in fine shape.

"We would have had a much tougher job if rippers hadn't worked," said W. A. "Wally" Swanson, Gibbons & Reed's young, alert Superintendent. "Practically everyone else planned to drill and shoot most of the rock, but it was our opinion that rippers would handle a good portion of the job. Our bid was low because we followed through on our conviction."

When this job was visited last autumn, Swanson had used up 40 per cent of the 325 working days he was allowed from April 26, and was driving for completion before winter set in. The grading was practically complete, the hot-mix asphaltic-concrete surfacing had been placed over half the job, and all culverts and drain structures were completed.

However, due to cold weather, the State stopped plant-mix paving operations with only 8,000 feet to go at the Pequop Summit end of the job. Except for that, the project was completed the latter part of October—96 per cent complete in 47 per cent of the contract time. Expecting to complete the paving this spring, the contractor left the hot-mix plant on the job through the winter.

New Highway Badly Needed

The new job, practically all on new location, will eliminate one of the worst sections of U. S. 40 in Nevada. The old road was loaded with sharp curves as it twisted from the desert plain at Oasis up the Pequop Mountains to Pequop Summit, 6,920 feet above sea level. It was especially treacherous because of grade and curvature during the snow season. But the rest of U. S. 40 through Nevada is a fast road, and the new job will bring this section up to the same standard.

Gibbons & Reed's contract included drainage structures, about 521,000 cubic yards of tough excavation, about 90,000 tons of gravel sub-base, and 21,000 tons of plant-mix paving. The job also included 3,800 feet of guardrail, because despite the fine new alignment, some of the fills are high and the mountain can-

yons are deep.

Engineers estimate that the saving in snow-removal and traffic-control costs alone will help materially to pay for the new highway over the years.

Design of Highway

The new job was built to plans prepared by the Nevada Department of Highways, under the Federal-Aid project number of 90 (13). For 2 miles at the east end, near Oasis, the highway was built two lanes wide with 8-foot plant-mix shoulders, making a total width of 40 feet. For the upper 3 miles through the mountains, the design called for a 48-foot 4-lane paved highway. The two sections are blended by a 300-foot transition.

Dense, compacted subgrade prevails



C. & E. M. Photo

A LeTourneau K-30 Rooter pulled by an International TD-24 rips up a rocky formation typical of Gibbons & Reed's 5-mile job on U. S. 40 in Nevada.

throughout the job, and the provisions for flexible sub-base were also the same for both sections. Specifications called for a 6-inch thickness of Type 1 (3-

inch-minus pit-run) gravel base to rest on the earth subgrade, with an additional 6 inches of the same material in
(Continued on next page)

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Hayward Buckets

Road Bidder Gambles But Rippers Pay Off

(Continued from preceding page)

rock cuts, where a commensurate amount of excavation was also removed.

On top of the pit-run material, a 3½-inch-thick course of Type 2 (1-inch-minus) crushed gravel was placed, with an asphalt prime coat of MC-1. Following this was a 2½-inch cake of plant-mixed asphaltic-concrete surfacing.

The new highway now has a maximum grade of 5 per cent, with super-elevated sections on the wide, sweeping curves. While the new highway was being built, traffic was maintained for the most part over the old road. At the west end on Pequop Summit, however, a 1,900-foot-long detour was built to carry automobiles around the job. In general, traffic was no serious problem—not as serious as the rocky cuts.

A permanent maintenance station, located down on the old road, was left in its location, and a new approach road to the new highway was built under this contract. It is 20 feet wide, with 6 inches of Type 1 gravel base and a 2-inch course of plant-mix surfacing.

Grading Is Key to Job

Grading was divided into two parts. The Type A excavation, totaling some 110,600 cubic yards, was mostly good grading with some boulders present. Only about 10 per cent of this had to be ripped. But the 410,000-cubic-yard Type B excavation was something else. About 350,000 cubic yards of this work was tough rock, which gave early indications that it would cause many a headache.

However, geological investigations indicated that the stone was mostly a bedded shale, faulted and jointed by seismic seams, with here and there a few outcroppings of black lime rock

which would, of course, be very hard to remove.

The job posed exceptionally long hauls. In fact, the plans showed 1,603,000 station-yards and 74,000 yard-miles of overhaul. Some of the long 8,000-foot hauls meant that rocky material at the Pequop Summit end of the job had to be hauled back through part of the finished roadbed to be deposited within the balance point.

To handle the long-haul work, fast rubber-tired equipment was used. Three Super C Tournapulls came in, with 6 Wooldridge Terra Cobras. Six Caterpillar D8's with Wooldridge and LeTourneau Carryalls were used on the shorter hauls and rougher work.

The contractor knew the rock would be hard to loosen at best, even if ripping was successful. He brought in 2 LeTourneau K-30 Rooters and had their shanks fitted with special Esco adapters and R-5 teeth points made of the finest hard steel. To pull each ripper, he used a new International TD-24 tractor, and to furnish even more power to the unit, a D8 Caterpillar machine was assigned to push against the rear end of the ripper.

The first attempts seemed doomed to disappointment. Over most of the rocky area lay a dense, hard crust. When the ripper teeth were lowered, the frame just slid along on top of this crust. Men smiled grimly and thought about explosives.

The material had its vulnerable spots, however, and before long the ripper teeth broke through one of them. Tractor engines roared and the rock began to tear out. The hard crust was difficult, but after it had once broken loose, the rock below was heavily fractured. A brownish, hard mass, it ripped out in pieces which were generally rectangular and seldom more than 10 inches on a side. Once the ripper was able to penetrate an area, the shaly material

was usually subject to being ripped out for loading.

With the help of push tractors, the Terra Cobras, Tournapulls, and scrapers began to load and haul the material. Grading then went ahead, with the equipment working two 9-hour shifts per day for about two-thirds of the job. Portable light towers were used to light the areas at night. It was a tough, brutal business for the rippers, but the machines hung together and broke out about 75 per cent of the hard Type B excavation.

Strangely enough, the broken material loaded best when only about 12 inches of the rock was ripped. By achieving this balance, the work was eased somewhat for the rippers, and the hauling equipment picked up fairly good loads. In some areas, the farther down the machines went in the heavy rock cuts the easier the material became to rip, and towards the bottom of the cuts the TD-24 sat around idle part of the time, waiting for the hauling units to catch up.

The black and gray lime-rock outcrops and intrusions, however, defied ripping. They simply would not budge. So drills and explosives had to be used there. Two Chicago Pneumatic 315-cfm compressors, an Ingersoll-Rand wagon drill and four Jackhammers, and a supply of Timken steel and detachable rock bits were used. The holes were drilled very close and then loaded to the top with Atlas Flo-Dyn bag powder and 40 per cent gelatin stick. About 2½ times more Flo-Dyn was used than stick. The holes were set off by No. 6 electric blasting caps. Heavy shooting pulverized the material to a point where it could be loaded by the grading equipment without too much difficulty.

Grading output varied from 150 to 600 cubic yards an hour with this equipment, depending on the length of haul and number of hauling units in use. Two mobile fuel and grease units serviced the machines in the field, and repair parts were installed at a field shop near the small town of Oasis.

(Continued on next page)



91-foot Composite Deck bridge built over Tres Pinos creek on Panoche road, 20 miles south of Hollister, California.

Composite Deck Bridges

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No false work, scaffolding or concrete forms.

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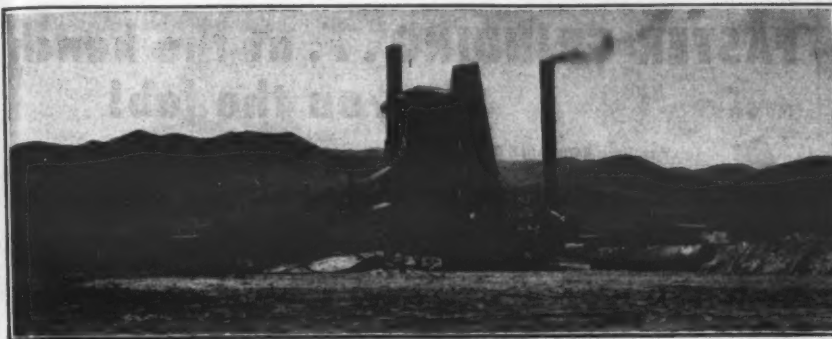
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WITTE DIESELECTRIC PLANTS

UNITED STATES STEEL



C. & E. M. Photos
For the Gibbons & Reed job in Nevada, this Standard Steel Corp. asphalt plant (above) was set up in the desert near Oasis. In the other photo are some of the men responsible for the fast action on the project: left to right, Assistant Resident Engineer Earl Stone, Gravel Foreman Johnny Lea, and General Superintendent W. A. Swanson.



haul: about 5 miles.

The materials passed through the plant, where asphalt and rock aggregates were heated to a temperature of

about 265 degrees F. An average of 4.8 per cent of bitumen was mixed in, though this varied from 4.4 to 5 per cent (Concluded on next page)

Flexible-Sub-Base Rock

Type 1 gravel base, composed of 3-inch-minus pit-run material, was available in a pit about 2 miles west of the Oasis end of the job. It was produced at a rate of about 250 tons an hour by a Northwest 1¾-yard shovel, which loaded the material directly from the pit to dump trucks. The material was then trucked to the road, spread in 6-inch layers, sprinkled with water, and rolled by tandem steel-wheel rollers.

The 1-inch-minus crushed material for the Type 2 gravel base came from a pit about ¾ mile west of Oasis. The fine mineral aggregate for the hot-mix was also produced there, and the asphalt plant for the job was set up near by. The same Northwest 1¾-yard shovel which was used in the pit to load Type 1 base material was used at the rock plant. The operating periods of the two activities did not coincide of course.

The rock-crushing plant consisted of Cedarapids equipment, and included a feeder hopper, a 30 x 32 roll crusher, a 4 x 12-foot vibratory screen, a 30-inch x 50-foot feed conveyor, a delivery conveyor of the same dimensions, a 42-inch cross conveyor, a 24-inch x 37-foot return conveyor, a 10 x 36 jaw crusher, and a 23-cubic-yard surge bin. The plant was powered by a Caterpillar D17000 diesel engine and produced about 200 tons an hour.

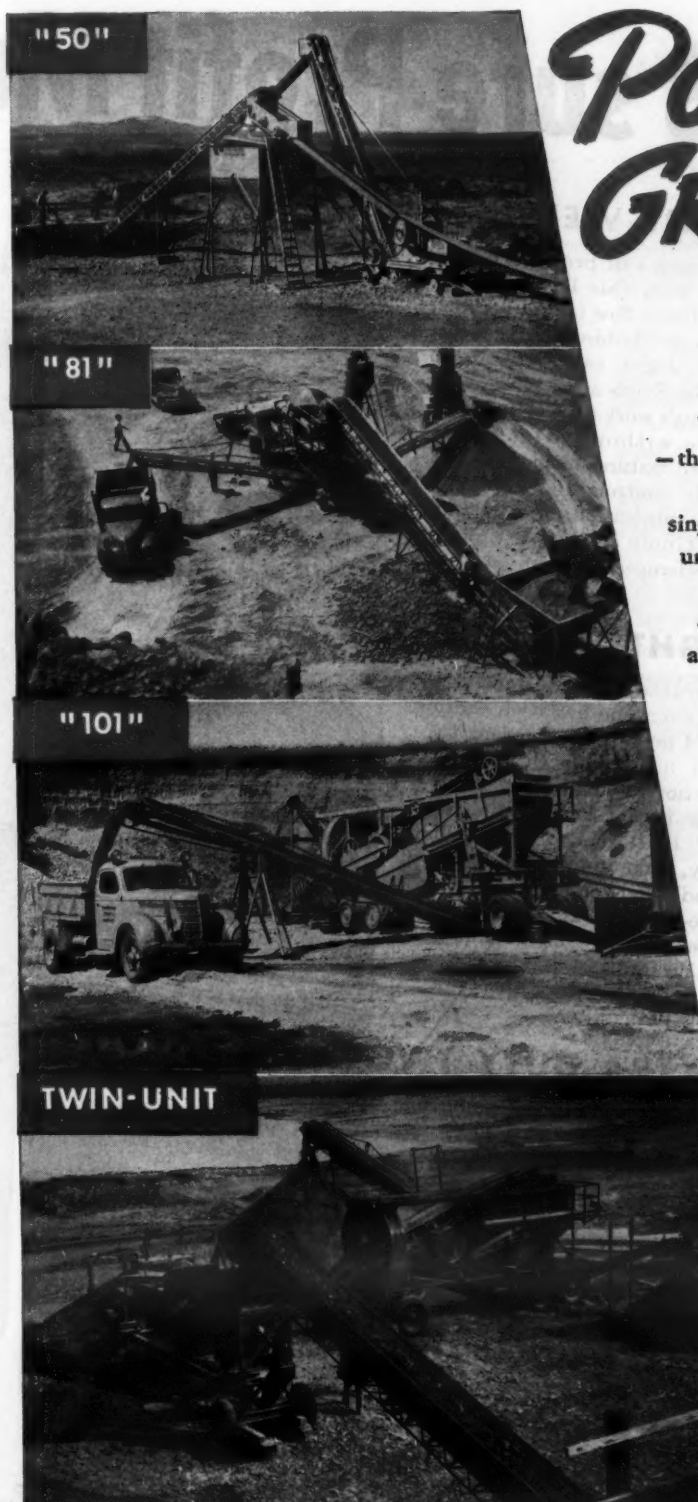
The raw material was shovel-loaded to trucks, which then fed the plant. Outgoing gravel-base material was trucked to the job, blade-mixed with water, and rolled down. Aggregate for the hot-mix plant was trucked over to that location and stockpiled for use.

Bituminous Work

The hot-mix plant, where the bituminous surfacing was prepared, consisted of a Standard Steel Corp. 2,500-pound-batch plant, last used on the Maine Turnpike and shipped back to the west. A Caterpillar D17000 diesel engine furnished the plant's main operating power, while a smaller 25-kw International-Palmer diesel electric generating unit supplied lights. Output of the Standard plant averaged 90 tons an hour, although a few runs of 100 tons per hour were made.

The bitumen for this mix was an SC-6. It came from Santa Maria, Calif.; the trip required about 7 days. It was spotted on the railroad siding of the Southern Pacific at Cobre, Nev., where a small 35-hp steam boiler heated the asphalt to pumping temperature. It was then trucked about 10 miles to the job, where it was unloaded to two 6,000-

gallon horizontal storage tanks heated by a 100-hp Scotch marine boiler. Fuel for the boiler was stored in a 6,000-gallon fuel tank. Boiler feed water was delivered to the plant by water trucks from springs on the Johnson Ranch, where all the rest of the water for the job was procured. This, too, was a long



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"101" The unrivalled production of the "101" is due to its high-speed Jaw and Roll Crushers, and its completely "balanced" design which provides unusually wide conveyors and extra-large positive-throw type vibrating screen.

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Austin-Western

Road Bidder Gambles But Rippers Pay Off

(Continued from preceding page)

cent. The mixed material weighed about 135 pounds per cubic foot, and a 9-hour plant run produced about 800 tons on average days.

The material was then discharged to the beds of waiting dump trucks which were rented locally. From 4 to 9 such trucks were used, depending on the length of haul. Specifications required that the material be spread in two 1 1/4-inch compacted lifts. An Adnun Black Top Paver was used for this work, spreading 10-foot lanes on the 40-foot work and 12-foot lanes on the 4-lane road.

The paving crew consisted of a foreman, 4 laborers, an Adnun operator, and a roller man. A Buffalo-Springfield three-axle 14-ton tandem machine was used for compaction. The weather was generally cool during the paving period, so the roller worked not far behind the Adnun machine. It was not at all uncommon for 10,000 linear feet of 10-foot strip to be mixed, laid, and rolled in a day.

Personnel

Swanson's work was under the general direction of J. "Pat" Gibbons, General Manager of Gibbons & Reed. The field forces included many of the company's top-notch foremen. Doc Nelson was in charge of drilling and shooting; Al Jensen, Vern Sharp, and Red Gray directed grading operations. Johnny Lea was on gravel-base production and finishing, Sam Warner laid black-top, Wayne Storm was in charge of the hot-mix plant and crusher, and Loran Runnells was Master Mechanic.

The job was designed and supervised for the State of Nevada under the direction of W. T. Holcomb as State Highway Engineer and J. A. Glock as Division Engineer. Paul Robins was the Resident Engineer, with Earl Stone as his assistant in charge of inspection.

By gambling on a rock-removal method, Gibbons & Reed licked this tough, remotely located highway job despite the long hauls for everything, including materials, water, and excavation.

High-Speed Sprayers For Use on Highways

High-speed spraying equipment is manufactured by the Jerome Simer Co., 422 Stinson Blvd., Minneapolis 13, Minn. The Road Runner sprayers are for all types of weed and insect control work along roadsides, right-of-ways, etc., and range in size from units small enough to fit in the trunk of a passenger car to large models with a 500-gallon tank capacity.

The pump on the large models has a capacity of 20 gpm and a lift of 20 feet. According to Simer, this is sufficient to run a 33-foot spray boom at up to 40 gallons per acre. It will pump either oil or water-base solutions. Other features of the Road Runner sprayers include tank-filling devices, remote-control boom-output valves, continuous agitation of the spray solution, by-pass-regulated spraying pressures, and special Simer nozzles said to apply the chemicals evenly with no drift or damage to adjacent crops.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 33.

Broadside on New Scraper

Information on the electric-controlled Model C Tournapull is contained in a large broadside released by R. G. Le-Tourneau, Inc., Peoria, Ill. In addition to complete specifications on the Model C, Bulletin TP-167 also features action shots of this 150-hp 16-ton-capacity

unit working in mud, in sand, and on steep grades, and making job-to-job moves at highway speed.

The catalog describes the main features of the rig, including the 17.3-mph speed, electric controls, power-proportioning differential, 2-speed power steer, 90-degree turns, large tires, disk-type air brakes, 30-degree oscillating pivot, and the Carryall scraper. The specifications listed in the bulletin cover dimensions and weights, the diesel engine unit, speeds, capacities, method of operation, etc.

This literature may be obtained from the company, or by using the Request Card at page 16. Circle No. 61.

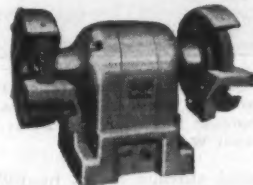
Paape, of Euclid, Is Dead

Walden W. Paape, Domestic Sales Manager of The Euclid Road Machinery Co., died recently at his home in Willoughby, Ohio. Mr. Paape joined Euclid in 1945. He had previously served with the LaPlant-Choate Mfg. Co. and the Caterpillar Tractor Co.

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Earth Flank Levees Tie In To High Ground; Extensive Drainage Involved; Gantry Handles Stem-Wall Forms

WITH the completion of a new concrete floodwall and flanking levees, Cannelton, Ind., on the right bank of the Ohio River, has been made safe against floods like those which have swept over the town on several occasions. While Cannelton has a population of only a few thousand, it has two rather large industries—cotton-bag and sewer-pipe manufacture—which draw employees from other towns along the Indiana shore, and also from Hawesville, Ky., across the river. A ferry connects the two towns.

Outstanding floods crippled Cannelton in 1884, 1913, 1937, and 1945. The most recent trouble from high water came in April, 1948, when a minor flood closed the sewer-pipe factory for three weeks and forced 75 families to evacuate their homes. With the new protection, constructed under the direction of the Louisville District, Corps of Engineers, the town will be safe from floods 3 feet higher than the record 1937 high water. The top of the new floodwall is at elevation 410.

This new complete protection consists of 2,300-foot earth levee starting from high ground at the upstream end of town; 5,000 feet of concrete T-wall along the river side of Front Street bordering the Ohio; and another embankment extending 1,400 feet from the lower end of the wall to tie in to a ridge downstream of Cannelton and back from the river. As this is the first enclosure of any kind fringing the town, considerable pipe work was involved in the construction in order to take care of the drainage area inside the wall and levees. The necessary right-of-way was obtained by local interests. Construction got under way in the spring of 1947 and was practically completed by the end of 1948.

The work was divided into two good-sized contracts. The Green Construction Co. of Oaktown, Ind., was awarded a \$333,500 contract by the Corps of Engineers for building the levee embankments and the bulk of the drainage facilities. The contracts for the concrete T-wall, costing around \$789,900, went to the G. L. Tarlton Co. of St. Louis, Mo. Contracts for the movable closure parts and pumping plants were yet to be awarded when the job was visited.

Earth Levees

Both levee embankments have 12-foot crown widths with 1 on 3 slopes on both sides. The upstream section averages 17 feet in height, while the downstream section is bigger, with an average

height of 26 feet. Available material was hauled from near-by borrow pits by tractor-scraper units and Tournapulls. It was spread in 8-inch lifts and compacted with six passes of sheepfoot rollers to a density of 95 per cent Proctor. The greater part of the fill was placed during 1947, but earth-moving operations were shut down during the winter of 1947-48. Heavy rains during the 1948 spring and summer delayed completion of the embankments until later in the year, as the borrow pits were thoroughly saturated with water.

Two of the larger drainage facilities included in this contract were a monolithic concrete interceptor sewer, 48 and 54 inches in diameter and 1,452 feet long, and a twin concrete box

7 x 7-foot culvert, 220 feet long. The circular interceptor sewer is located along the land-side edge of Front Street, from 14 to 18 feet deep in the ground. The culvert, which passes under the wall to empty into the river, drains Castleberry Creek and the interceptor line. It is equipped with 84-inch sluice gates which will be closed in flood time. Then the water, including both the inside run-off and the sewer flow, will be pumped into the river. Three pumping stations will be constructed for this purpose under a future contract, with one 24-inch and two 42-inch discharge lines passing under the wall at Castleberry Creek. Two smaller stations will be constructed at locations near the downstream end of the project. At the outlet end of the pipes Armco flap gates will remain closed except when the pumps are working.

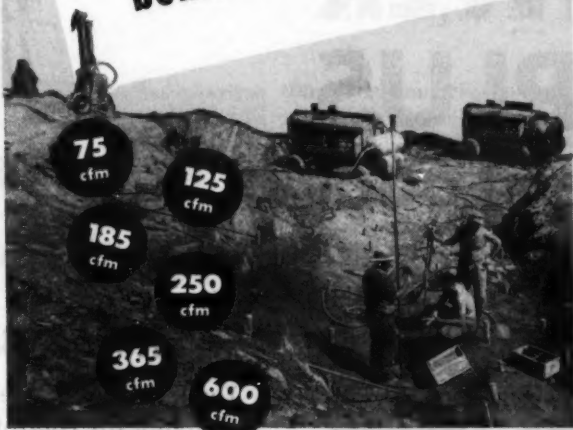
In addition to these main drainage works, sewers were laid in several blocks with connections to the inter-

(Continued on next page)



C. & E. M. Photo
On the Green contract for drainage facilities at the Cannelton, Ind., floodwall, a Lorain 41 crane lowers timber for cross bracing down into the trench excavated for a 48-inch sewer.

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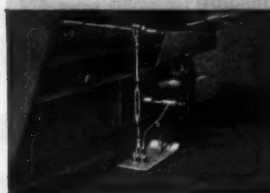
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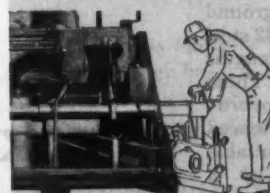
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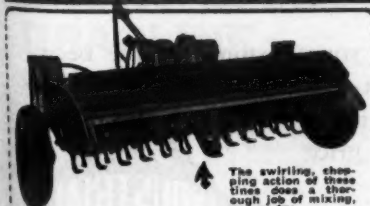
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C. & E. M. Photo

You are looking downstream on the Green contract as backfill is placed on top of the 54-inch monolithic sewer with pneumatic tampers. A D4 dozer pushes material down for use in the backfill.

Concrete Floodwall Built at River Town

(Continued from preceding page)

ceptor sewer. These lines ranged from 12 to 36-inch-diameter pipe, either concrete or vitrified clay. Considerable relocation of existing sewers and utilities was also necessary because of the new construction. With three high river stages occurring during the early months of 1948, pipe laying was slowed considerably; the trenches kept filling up with water, and almost constant pumping was required to empty them.

Monolithic Sewer Line

In constructing the 48-inch and 54-inch monolithic interceptor sewer, a sheet-pile cofferdam was driven. This was necessary because of the depth of trench, 14 to 18 feet; the limited working strip available in back of the wall; and the general wetness of the ground so close to the river. Heavy MZ-32 steel sheet pile sections in 20-foot lengths were driven for the cofferdam. These were rented from the Federal government when difficulty was experienced in procuring lighter, more suitable sections. Driving was done by a McKiernan-Terry No. 7 air hammer powered by a Gardner-Denver 500-cfm air compressor. The average width between the rows of sheeting was 8 feet.

Excavation in the cofferdam was carried out by a Lorain 41 crane equipped with a 45-foot boom and an Owen

¾-yard clamshell bucket. Because of the restricted space on a portion of the area the crane worked from a mat of 8 x 10's laid across the top of the rows of sheeting. The material excavated was chiefly a silty clay. Bracing consisted of two horizontal 8 x 10's on each side, about 6 feet apart vertically and with lateral 8 x 10 braces at both levels on 9-foot centers longitudinally along the trench. The top and bottom members were cross-braced with 2 x 6's. For unwatering the trench two Jaeger pumps, a 4-inch and a 2-inch, were available, along with an Ingersoll-Rand 3-inch air pump.

Within the cofferdam the forms were built for the sewer pours. Their construction featured rows of 2 x 6 ribs on 18-inch centers to which was nailed 1 x 6 tongue-and-groove lumber. These boards were scored in three places along the back so that they would warp to the ribs and close up the joints. Openings were left between the forms at the top for the entrance of the concrete. For the culvert the forms were



C. & E. M. Photo

At the downstream end of the Tarlton job, a Speedcrane with an Insley 1-yard bucket places concrete in the 24-foot-high floodwall. A MultiFoote 27-E paver mixes the concrete.

made from ¾-inch plywood backed with 2 x 6 studs on 16-inch centers,

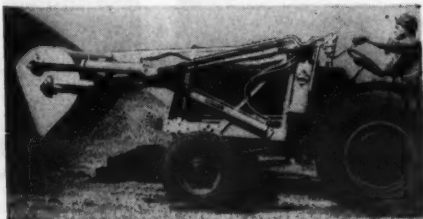
with double 2 x 6 wales on 30-inch centers. Universal form ties were spaced on an average of 24-inch centers.

Concrete Pouring

At the upstream end of town a central batch plant was set up. It consisted of a Winslow Binabatch 3-compartment bin which was charged by a Lorain Moto-Crane with a 45-foot boom and a Blaw-Knox ½-yard clamshell bucket. Crushed stone for the mix was supplied by the Louisville Cement Corp. from its quarries either at Speeds, Ind., or Milltown, Ind., and from Hy-Rock Products, Inc., Marengo, Ind. Sand came from the Ohio Valley Co. at Tell City, Ind., and River Sand & Gravel Co., Owensboro, Ky. Bag cement was supplied by the Kosmos Portland Cement Co. of Kosmosdale, Ky. Darex air-entraining agent was added. Water for the mix was tapped from the town hydrants.

Batches were mixed in a Smith 16-S
(Continued on next page)

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Hydraulically controlled bucket is shown above at load start position. Double action cylinders are placed in power plus horizontal thrust position. Note powerful triangular construction.



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C. & E. M. Photos
The batch plant on the Tarlton floodwall contract is pictured above; the Blaw-Knox cement bin in the center and the Johnson aggregate bin at right, enclosed for the winter. At right are two views of wall pours: in the first, a Northwest crane lifts a Blaw-Knox concrete bucket to the top of the forms (note the safety guardrail); in the second is the gantry crane used to position the forms.



Concrete T-Wall

The G. L. Tarlton Co. spent the 1947-48 winter on work preliminary to its
(Continued on next page)

mixer and discharged into concrete buckets which were set, two at a time, on a flat-bed truck. Four buckets were on hand for a pour—one Blaw-Knox 1-yard, one Insley 1-yard, and two Insley 3/4-yard buckets. Two trucks, each holding two buckets, hauled the concrete an average 1/2-mile distance from the batch plant to the forms. There one of the two cranes handled the buckets, and as the concrete was placed it was vibrated with Master vibrators. The reinforcement for the structures was supplied by the Truscon Steel Co. out of Indianapolis, Ind. Curing of the concrete was done with Kapco 640 and with city water. The interceptor sewer was poured in 24-foot monoliths.

In backfilling the trench, two Caterpillar tractor-dozers—a D7 and a D4—were on the job. They pushed the material into the hole where it was compacted by pneumatic tampers—4 Ingersoll-Rands and 4 Cleavelands. In addition to the large 500-cfm compressor, there were two I-R 315-cfm units on the job. After the pneumatic tampers had reached a point above the top of the sewer again, the rest of the backfill was compacted by sheepsfoot rollers.

Of the different kinds of pipe employed on this contract, the concrete pipe came from the Kentucky Concrete Pipe Co. of Owensboro, Ky.; the metal pipe was supplied by Armco from Middletown, Ohio; and the vitrified pipe was furnished by a local firm, the Cannelton Sewer Pipe Co.

Quantities and Personnel

The major items on this levee and drainage contract included the following:

Levee embankment	185,000 cu. yds.
Stripping	30,000 cu. yds.
Trench excavation	17,000 cu. yds.
Reinforcing steel	95,000 lbs.
Concrete monolithic sewer, 48 and 54-inch	1,452 lin. ft.
Sewer pipe, concrete and vitrified, 10 to 36-inch	2,000 lin. ft.
Corrugated-metal pipe, 48-inch	326 lin. ft.
Concrete for structures	1,075 cu. yds.

The Green Construction Co. employed an average force of 50 on its contract under the supervision of Glenn Stockrahm, Superintendent.

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Concrete Floodwall Built at River Town

(Continued from preceding page)

contract. It set up a batch plant, moved in materials, built forms, etc., so that it could begin construction on the concrete T-wall early in the spring of 1948. Unfortunately the April high water shut the job down for three weeks. But once the weather became favorable, work began to progress at an efficient tempo.

The floodwall consists of a concrete key wall at the river-side toe of the structure, a slab footing or base, and a stem wall. The key or toe wall varies in depth from 6 feet 4 inches to 8 feet, and is 18 inches wide at the bottom and 3 feet at the top. The slab footing varies in width from 20 to 26 feet, according to the height of the wall, and has a minimum thickness of 18 inches at the edges to 34 inches at the center below the stem wall. The stem wall extends from 19 to 24 feet high above the bottom of the footing. At the top elevation of 410.0 it is 18 inches wide, and is battered from there to the bottom on both sides at the rate of $\frac{1}{4}$ inch to the foot. For a 19-foot-high wall the stem is 27 inches thick at the bottom. The backfill is from $2\frac{1}{2}$ to 3 feet thick above the footing.

The wall was poured in three sections—toe or key wall, base or footing, and stem, in that order. While the wall is made up of 20-foot monoliths, it was poured in 40-foot sections with a joint at the mid-point of the section. The joint consists of asphaltic expansion material with a continuous copper water stop extending through all three sections. For a 20-foot length of wall the base contains from 30 to 52 cubic yards of concrete, while the stem contains from 22 to 27 yards. The wall is reinforced with Bethlehem steel.

Four closure gaps have been left in the wall for pedestrians, and four for vehicles. The latter are located at Taylor Street, to serve the ferry plying the river; at Herzelle Street; at Madison Street for both vehicles and a spur track leading into the Cannelton Sewer Pipe Co. plant; and at the downstream end of the project to admit the tracks of the Southern Railway whose branch line ends in Cannelton. At one point on the project the contractor, at his own expense, moved about 2,000 feet of track as much as 15 feet away from the wall in order to get some unencumbered working space. (The track will be left permanently in that location which was found to be more advantageous for the Railroad and for Cannelton.)

Concrete Batch Plant

A concrete batch plant was set up at the downstream end of the job on a siding of the Southern Railway. Bulk cement was shipped in cars from the Louisville Cement Corp. plant at Speeds, Ind., and stored in a Blaw-Knox 300-barrel cement bin. The same company also supplied the two sizes— $1\frac{1}{2}$ -inch and $\frac{3}{4}$ -inch—of coarse aggregate. Vinsol resin, an air-entraining agent, was interground into the cement at the mill, and more was added at the mixer when necessary to bring the air content up to $4\frac{1}{2}$ per cent. The Bedford-Nugent Co. of Rockport, Ind., furnished the sand. The aggregate was stored in a Johnson 200-ton 3-compartment bin. Since this sand was rather coarse, as is practically all the sand taken from the Ohio River, fine sand was also brought to the job from the Hougland & Hardy pit at Sand Ridge, Ind. The fine sand was stockpiled, and a platform was built alongside from which the sand was loaded into wheelbarrows and dumped into the batch trucks as they left the plant.

Normally, no crane was used at the batch plant to charge the aggregate bin. The coarse sand, which was trucked

in, was dumped into a hopper at the side of the bin and raised by an enclosed elevator to the top of the structure where it was discharged into the proper compartment. The crushed-stone aggregate, shipped to the job in hopper-bottom cars, was unloaded by a Baughman conveyor to a hopper. From the bottom of this hopper the material dropped onto a similar conveyor which carried it to the hopper at the foot of the bin elevator. From there it was lifted up to the storage bin. A chute at the top of the elevator was shifted about on a swivel to direct the aggregate into any of the three compartments.

Only occasionally, when concrete was

being poured at a sustained pace by the two mixing rigs, was it necessary to send a crane to the plant to speed up the flow of aggregate. Then the Northwest 25 crane with a 50-foot boom and a $\frac{3}{4}$ -yard clamshell helped to load the bins.

Up to six trucks, holding three batches each, hauled the material from the plant to the forms, where the concrete was mixed in two MultiFoote 27-E pavers. The average haul for these hired trucks was $\frac{1}{2}$ mile. Some concrete was mixed in two Jaeger 3-yard truck-mixers when tight places were being poured where it was difficult to maneuver the pavers. Then the

concrete was either chuted directly into the forms, as on a base pour, or else discharged into buckets which were lifted to the forms by cranes. Hydrants were conveniently located along the job so that water was always readily obtainable for the mix.

Form Work

The trench for the wall was excavated by a Northwest No. 6 dragline with a 65-foot boom and a Page $1\frac{1}{2}$ -yard bucket. A specially built backhoe bucket was then put on the shovel boom of this rig to dig out the toe-wall excavation. The bucket was shaped to the

(Continued on next page)



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outline of the toe wall which was poured without forms. For unwatering the excavation two 6-inch pumps, a Barnes and a Jaeger, were on hand, as well as a half dozen 2-inch pumps. The base was poured with conventional wooden forms at the rate of 200 yards of concrete in a 10-hour day.

Forms for the stem sides were made up in two 20-foot-long sections which were fastened together to make a single 40-foot panel. The connection was made with three $\frac{3}{4}$ x 38-inch rods on each side, the rods passing through the I-beam framework. The forms were constructed of diagonal 1-inch wood sheeting, faced with $\frac{1}{4}$ -inch tempered

Masonite and backed with horizontal 4 x 4-inch studding on 12-inch centers. The vertical wales were 16-inch 36-pound I-beams, 20 feet long, on 3 $\frac{1}{2}$ -foot centers. The opposite forms of the stem walls were tied together with 1 $\frac{1}{4}$ -inch bolts, one at the top and one at the bottom of each I-beam. Bulkheads for the stems were 1-inch 3-ply laminated lumber which was easily removed.

During the pouring of the base, temporary anchor bolts with plate washers over them were embedded in the concrete in two rows, one on either side of the center. Next, 45-pound T-rails were set on top of the concrete base to form

a track with a 19-foot gage. The plate washers on the anchor bolts slipped over the base of the rail and held it in place as the bolts were taken up. Over this track rode the gantry which the contractor had fabricated in St. Louis especially for this job.

Set Forms With Gantry

The gantry consisted of a structural-steel framework which rode the rails on four double-flange wheels, two to a side. It was 21 feet long, and had a vertical clearance of 24 feet so that it straddled the top of the highest section of stem wall. A ladder ascended to the nearly square platform on top

where a Hercules 6-cylinder gasoline engine was placed to move the gantry along the rails by means of a chain-and-sprocket drive. The engine also powered the four Gar Wood winches that were placed up on the deck to lift the heavy forms. A 40-foot section of stem forms weighed nearly 40 tons.

The usual procedure was for one of the larger cranes to set the two 20-foot panels to a side roughly in place. Then the gantry moved over the spot, picked up the panels, and placed them precisely for the next pour so that they could be bolted together. The pick-up was made with two 1 $\frac{1}{2}$ -inch bars on each side,

(Concluded on next page)

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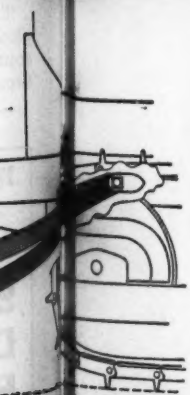
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C. & E. M. Photo
This shot looking down the center line of the concrete floodwall at Cannelton, as hose is adjusted for water curing, was taken from the top of the gantry.

Concrete Floodwall Built at River Town

(Continued from preceding page)

the bars passing through holes made in two adjoining I-beams. Loops were welded to the bars to form a sling which was engaged by the hook lowered from the winch. Thus there was no slipping when the panels were raised. Each side of the form was also braced at the base with four sections of 2½-inch pipe. The lower ends of the pipes were secured to bolts embedded in the concrete base of the wall.

Stripping the forms was also speeded up by the gantry. A hand winch at the base of each corner permitted the form to be pulled out at the bottom, while at the same time it was being lifted by the winches on top. The forms, of course, were oiled to facilitate the stripping. In warm weather the stem forms were usually taken off 24 hours after the completion of the pour; in cooler weather this time was extended.

Placing the Concrete

The bulk of the concrete in the stem walls was placed from Blaw-Knox or Insley 1-yard buckets which were filled directly from the drum of the paver—with the boom and bucket of the paver set off to the side. Each of the two MultiFoote 27-E pavers worked with

a crane which handled the concrete buckets so that separate pours were made at different points on the project. The cranes used were chiefly a North-west with a 65-foot boom and a Manitowoc Speedcrane with a 60-foot boom. Around the top of the forms a pipe railing was constructed for the safety of the workers.

As the concrete was brought up in 18-inch lifts, it was vibrated with Mall and Master vibrators. It usually took about four hours to pour a 40-foot stem wall section. After the forms were stripped the gantry moved them along to the next section to be poured. The concrete in the base was cured with Aquabar Kuraseal compound, but the stem walls were cured with water applied through soaker hose laid along the top of the wall, and with curing compound.

Quantities and Personnel

The major items in the concrete-floodwall contract included the following:

Common excavation	29,000 cu. yds.
Backfill	15,300 cu. yds.
Concrete	19,000 cu. yds.
Reinforcing steel	1,948,000 lbs.

The sewers, concrete wall, and levees were completed by the end of 1948. Backfill and street replacement along the floodwall will be completed in the spring of the year.

The G. L. Tarlton Co. employed an average force of 85 men on its contract, under the supervision of M. M. Gallup, Treasurer, and Armin M. Schultes, Secretary of the firm. For the Department of the Army, Corps of Engineers, Arch K. Boyle is Resident Engineer. The Louisville District is headed by Colonel J. L. Person, District Engineer.

New Officers for Dravo

Three Directors and two Vice Presidents have been elected by the Dravo Corp. of Pittsburgh. The Directors are Gordon W. Cameron, Louis A. Mertz, and Howard H. Sturdy. Vice Presidents are Mr. Sturdy and Byron E. Rhoads.

Portable Batching Plants

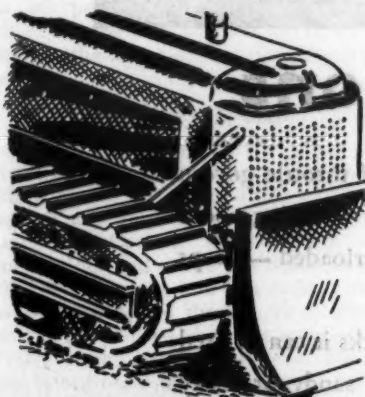
Portable aggregate batching plants are described in a 12-page bulletin prepared by The Heltzel Steel Form & Iron Co., Warren, Ohio. The bulletin emphasizes the manner in which these plants can be shipped and handled, and how they are designed for ease in erection. The Heltzel Type 1 bins are made with capacities of 52, 72, 85, and 100 tons.

Bulletin C-34-A includes information on the compartments of the Heltzel portable bins, their capacities, conversions, columns, gates, batchers, scales, loading, etc. It gives plan and end details for erecting the Type 1 portable bin with a dual aggregate batcher; for batch truck or truck-mixer operations, with an option of dial or beam-type scales; and with special extended columns. It also pictures seven typical installations of Heltzel plants.

This literature may be obtained from the company, or by using the Request Card at page 16. Circle No. 68.

BIG BUY

of the Medium Duty Field



**INCREASE TRACTOR
Power!**

• Worn grouser shoes, retipped with BULLDOG TRACTOR GRIP-LUG provide deep-biting traction on any terrain... utilize full engine power... save time, fuel and often contracts! Write for complete information, or contact your equipment dealer for details.



Sole Producers
ALLIED STEEL PRODUCTS, INC.
7831-35 BROADWAY CLEVELAND, OHIO

BIG "Army Workhorse" Engine

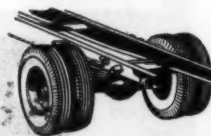
the same famous GMC "270" that performed so dependably and economically in nearly 600,000 military GMCs... with such quality features as Full-Pressure Lubrication, Tocco-Hardened Crankshafts, Airplane-type Main Bearings.

BIG Roomy Comfortable Cab

eight inches wider and seven inches longer than prewar, all steel-welded with 22 per cent greater vision, seats with double the number of springs, automatic built-in ventilation system, complete insulation and soundproofing.

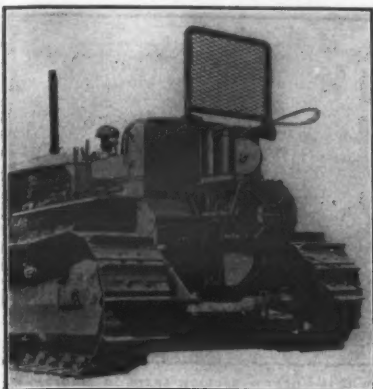
BIG Husky Frame and Chassis

with heavy duty frame of 10 1/2 section modulus... big husky axles, clutch, transmission, brakes and springs. Built to handle gross vehicle weights up to 21,500 pounds and truck and trailer weights up to 37,000 pounds.



Built by the Biggest Exclusive Producer of Commercial Vehicles

GMC TRUCK & COACH DIVISION • GENERAL MOTORS CORPORATION



Here's a model view of the new single-drum Hyster HySpeed winch designed for use with Caterpillar D6, D7, D8, and DW10 diesel tractors.

Single-Drum Winch Features High Speed

A new single-drum winch has been brought out by the Hyster Co., 2902 Clackamas Ave., Portland 8, Oreg., for use with Caterpillar D6, D7, D8, and DW10 tractors. Features claimed for the HySpeed winch include light weight, high speed, and friction drive.

Planetary gearing in the unit permits the drum to free-spool the cable when the clutch and brake are released, explains Hyster. A 2-lever hydraulic control system is standard on all four tractors. Single-lever mechanical controls, synchronizing clutch and brake action, are available as optional equipment for all models except the DW10.

All gearing is enclosed and runs in oil. The design of the HySpeed winch permits it to fit into stiffleg crane booms. It can also be installed on RD8, 75, and 70 Caterpillar tractors.

Further information may be secured from the company, or by using the Request Card at page 16. Circle No. 77.

Soldering Iron Has Chemical Heating Unit

An entirely self-contained soldering iron is announced by The Kemode Mfg. Co., Inc., 161 W. 18th St., New York 11, N. Y. The Quik-Shot iron uses a chemical cartridge similar to a flashlight battery for its source of heat. It requires no electrical connections or other sources of heat.

Kemode points out that the cartridge provides enough heat to keep the iron in constant operation for periods of approximately 7 minutes; that it will heat to a maximum temperature of over 800 degrees F in less than 10 seconds; and that it will maintain a temperature of over 450 degrees for the 7-minute period. The heat developed is said to be equivalent to about a 250-watt peak.

The cartridge is ignited by the impact of a spring rod located at the end of the handle. The chemical mixture consists of magnesium-type powders, which generate heat without gas. Six interchangeable tips are available for use with the iron. They range in size from $\frac{3}{8}$ to 1 $\frac{1}{2}$ inches and come in pyramid or chisel types.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 25.

Goodyear Makes Changes

Goodyear Tire & Rubber Co. has completely reorganized the field supervision of its Mechanical Goods Sales Division. The new Eastern Sales Division, consisting of the Boston, New York, Pittsburgh, and Cleveland districts, is under the direction of O. A. Schilling. H. E. Langdon is in charge of the Central Sales Division, comprising the Chicago, Detroit, Minneapolis, and Cincinnati districts. R. B. Warren is in charge of the Southern Sales Division, covering Charlotte, Atlanta, St. Louis, and Dallas. And R. G. Abbott, District Manager in Los Angeles, heads

the Western Sales Division.

Goodyear also announces that M. W. Sledge has been appointed Assistant Manager of the Belting Sales Department, replacing the late W. P. Hallstein.

List of 94 Jack Models

Lever, screw, and hydraulic jacks are described in a 4-page bulletin issued by Templeton, Kenly & Co., 1006 S. Central Ave., Chicago 44, Ill. Among them are single-acting ratchet-lowering jacks, 4-way or ratchet-head screw jacks, hydraulic pullers, hydraulic jacks in a capacity range of 3 to 100 tons, jack supports, push and pull jacks, speed journal and bridge jacks, reel or drum jacks, trench braces, and others. Also covered is the Simplex Util-A-Tool, a single tool designed for pushing, pulling, spreading, and lifting operations.

"Bulletin: Industrial 49" has been completely revised to bring all specifications and prices up to date. The 12

different jacks it lists are available in 94 different models. Complete specification charts, selection guides, and price listings are included.

This literature may be obtained from the company. Or use the Request Card at page 16. Circle No. 82.

Allis-Chalmers Ups Garity

R. F. Garity is the new Eastern Industrial Territory Manager of the Allis-Chalmers Tractor Division. He will make his headquarters at the company's home office in Milwaukee.

A MIXER built for ASPHALT!

YOU can't mix asphalt like concrete. It takes better equipment to accurately proportion and mix asphalt. The Foote Kinetic Mixer is especially designed and built for asphalt, and is not comparable in any way with the ordinary concrete mixer. It provides a mulling action. Asphalt is pumped between and within the aggregate layers assuring complete coating of every particle of aggregate without waste of asphalt. This means 8 to 10 batches more out of every barrel of asphalt. Capacity is 3 cu. ft. in 30 seconds. Ask for Bulletin K-100.



the **FOOTE**
Kinetic
mixer

A BLAW-KNOX PRODUCT

THE FOOTE CO., INC.
Manufacturers of Mixer Trucks

1916 State St. • Nunda, New York

Shift at Any Speed on Any Grade with the New Eaton Electric Shift for

EATON 2-Speed Truck AXLES



The introduction of the new Eaton electrically powered and push-button operated shift makes available major advancements in axle control. It provides fast and positive action unaffected by altitudes. At the same time, shifting is easier and smoother, because the actuating force is uniform at all times. The consequent reduction in wear, together with the simplicity of the operating mechanism, contributes directly to lowered maintenance costs.

The result is improved axle and vehicle performance, and greater driving ease and safety. See your truck dealer for the full story of Eaton electrically controlled 2-speed axles.

More Than a Million
Eaton 2-Speed Axles
in Trucks Today



Axle Division
EATON MANUFACTURING COMPANY
CLEVELAND, OHIO

PRODUCTS: SODIUM COOLED, POPPET, AND FREE VALVES • TAPPETS • HYDRAULIC VALVE LIFTERS • VALVE SEAT INSERTS • ROTOR PUMPS • MOTOR TRUCK AXLES • PERMANENT MOLD, GRAY IRON CASTINGS • HEATER-DEFROSTER UNITS • SNAP RINGS • SPRING TITLES • SPRING WASHERS • COLD DRAWN STEEL • STAMPINGS • LEAF AND COIL SPRINGS • DYNAMATIC DRIVES, BRAKES, DYNAMOMETERS

Earth-Movers Star In Soil Conservation

Tractor-Dozers, Graders Battle Soil Erosion in Nebraska as Contractors Build Terracing Systems

By L. A. HAWKINS

HEAVY earth-moving equipment, called into the battle to save soil needed to feed the world, is playing a decisive role in the Cornhusker State. Much of Nebraska's rich topsoil is being reclaimed and conserved by contractors' powerful machines. Crawler tractors with dozer blades, as well as motor graders, are erasing the scars of erosion and preparing the land for productive contour farming.

Just as infantry commanders call on armored units to turn aside an enemy attack, Nebraska's soil-saving farmers turn to construction contractors for aid against ravaging flash floods and heavy rainfalls. Contractors throughout the state are heavily engaged in clearing now-worthless land for profitable cultivation, and installing terracing systems. Terracing makes it possible to farm much land that was previously waste. It also protects against further damage by run-off water.

Nebraska's Erosion Problem

Nebraska's soil-erosion problem stems from the frequent, heavy precipitation of water on its rolling prairie-land. Rainfalls of from 6 to 7 inches in 12 to 24 hours are common. Flash floods—sudden, heavy downpours—often bring 3 to 4 inches in as little as 4 hours.

Pouring down the slopes of the farmland, swift floodwaters carry away much of the thin layer of rich topsoil and carve out natural waterways, or gulleys, as they race towards the nearest creek or draw. Owing to the columnar character of Nebraska soil the land erosion is vertical in nature, as in other prairie states. The gulleys are deep and steep-walled, rather than shallow and broad.

These gulleys constitute more than strips of wasteland and channels through which the farmers' best soil is carried away. They are impassable barriers which block farmers working their fields.

Protective System

The overall protective system against soil erosion includes terraces and waterways—or terraces and a series of dams in unusually bad gulleys—which together slow down the water and take the sting out of its destructive power. A much greater amount of water is absorbed by the ground as a result. It is estimated that a mile of terrace will retain 500,000 gallons of water. The balance of the water flows gently off the field without damaging the soil or crops.

Heavy industrial equipment comes into the picture both in building terraces and in eliminating gulleys. It is generally necessary in an effective conservation system to transform the erosion gulleys into protected waterways to which the terraces direct the water. This is to be expected, since erosion ditches occur along natural drainage paths determined by the terrain. In some cases, it is found advisable or necessary to build other waterways to cut down the volume carried by certain channels.

Each farm tract offers a new challenge and a slightly different problem to the soil conservationist and the contractor handling the work. What type of earth-moving operations will do the most good in recovering wasteland and preventing further ravages depends on characteristics of the terrain, the ex-

tent of the damage already done, the amount of money the farmer invests in first improvements, and other similar factors.

Soil-Conservation Districts

Contractors handling soil-conservation jobs have become quite expert in determining the requirements of each piece of land. In most cases, however, the engineering of a protective system is done in a conference between the farmer, the contractor, and representatives of the soil-conservation district.

The districts have been largely instrumental in promoting soil-conservation practices. They are organized as independent boards in each county. Each follows an overall state program incorporating recommendations based



High spots are cut down and low ones filled on this quarter-section farm in Nebraska by a Marvin Landplane which is pulled by a TD-18 tractor. Brown Brothers, of Cozard, is the contractor on this soil-conservation work.

on the latest findings of the Federal Soil Conservation Service and college research. Since each county has slightly different problems, the various boards modify their activities accordingly. Throughout the state, industrial contractors work closely with these boards. In cases where a contractor's operations

cross county lines, his men and equipment do the soil-saving job to varying specifications, depending on the location of the farm.

Terracing

A good deal of earth-moving is in-
(Continued on next page)

THE TIGER BRAND SPECIALIST SAYS—

"It's not use but abuse"

U.S.S. AMERICAN TIGER BRAND WIRE ROPE UNITED STATES STEEL



volved in soil-conservation jobs. In constructing protective systems, Nebraska contractors are using bulldozers and motor graders to do the job with maximum speed and efficiency.

The motor grader is the contractors' choice as the ideal terracing machine, particularly because of its effective compaction of soil on the terrace. Terraces

are, in effect, shelves of dirt cut into the hillside and sloped inward. They curve around the hill to join the waterways, and are graded slightly from their point of origin towards the outlet. They are spaced down the slope at intervals depending on the grade of the land. On an average, the distance between them is approximately 75 feet.

The two International TD-14's with dozers, at left, are building a waterway to halt erosion in a farm near Omaha. They are owned by contractor Albert Cornish, of Meadow, Nebr. Above, an Adams No. 511 motor grader owned by Frank J. Johnson of Omaha compacts the fore-slope of a 1,650-foot terrace on a farm near Louisville, Nebr.

Actually, the farmer could do the terracing himself with his wheel tractor and the proper equipment. But farming is rigidly seasonal, and the farmer often finds he cannot get the soil-conservation job done before it is time to plant

a crop, or before the rains come and ruin the uncompleted system.

On the other hand, the motor grader can do the work much faster, and while the earth-mover does the terracing, the farmer goes ahead with his work on the crops. Farmers who have once seen the result of terracing on a neighbor's land find the contractor's price for the job very reasonable.

It is generally agreed that one mile of terrace will effectively protect 12 to 13 acres of land having a slope of 6 degrees. Once a farmer has brought up a stand of any sort of crop on the terraces, and of brome grass, alfalfa, or both on the waterways, the results in halting erosion are impressive. A typical system installed one spring has been reported as withstanding a 7-inch rain the next, without suffering the slightest damage. Specifications of the Soil Conservation Service for terraces are designed to afford protection against as much as 3 inches per hour.

In constructing terraces, graders usually work an area about 50 feet wide. Dirt is borrowed from the hillside and built into a wide shelf; there is a channel 6 to 8 feet wide and quite flat, a gently graded backslope down which rain water flows to the channel, and a foreslope rising to a crest (the terrace itself) to retain the water and confine it to the channel.

The motor grader spreads the dirt and builds a well packed mound of earth the length of the terrace. This must resist the action of running water, yet be so easy of contour that farming operations are not interfered with and not an inch of productive land is lost.

Waterways

This same principle of supplying easy grades for farming operations is observed in building waterways. The floor of the waterway is made quite flat and wide—50 to 75 feet as a rule. Rough areas in the slopes on either side are flattened out so they will not give the farmer trouble. Another result of the broad, flat area is to cause the water to spread out and flow in a thin sheet rather than in a narrow, cutting stream.

Eliminating erosion ditches and supplanting them with protected waterways is often a task calling for earth-moving operations of considerable scope. With any kind of ditch, even the smaller erosion gulleys, the job demands well planned excavation and thorough compaction of the dirt fill.

Dirt is borrowed from the slopes on either side, starting rather far back in order to grade the land gently towards the waterway, and rolled into the gully. The dirt fill is compacted by the machines working over it. Many contractors do this job with their motor graders.

Albert A. Cornish of Meadow, Sarpy County, Nebr., who has been doing soil-conservation work since 1931, uses two International TD-14 diesel crawler tractors in converting erosion gulleys to waterways. He has developed a system of gully control which involves filling in for waterways immediately in

(Continued on next page)

that determines wire rope life" check your application

"Everything was wrong on this job. When I arrived the superintendent and the operator were having a terrific argument. The 'Super' claimed that the operator was wearing out wire rope twice as fast as anybody else on the job. The operator blamed the machine. I could see that nobody knew the real source of trouble.

"I offered to give them a complete check-up and they both jumped at the chance. It turned out that they were using cast iron sheaves which were too soft. To make it worse, the wire rope was not preformed and tended to twist and squirm as it passed over the sheaves.

"The rope bit into the sheaves and the sheaves got rough and chewed up the rope.

"That's the story. I recommended harder manganese steel sheaves and Excellay Preformed Wire Rope. With the right rope for the job, they ought to get twice the service."

How proper wire rope application saves you money

There is always one best type of wire rope for every application and the TIGER BRAND Wire Rope Specialist can help you select the right ropes for your particular needs. His job is to make sure that the rope is not overloaded. He checks the sheaves for proper size, wear and alignment. He instructs your operators on proper rope care and does a dozen other things to assure long service life at low unit cost for wire rope.

To help you maintain these operating standards, we have prepared a booklet entitled, "Valuable Facts about the use and care of Wire Rope." Every key man on your operating staff should be supplied with this much needed information.

SEND FOR FREE BOOKLET

American Steel & Wire Company
Rockefeller Building, Dept. O-5
Cleveland 13, Ohio

Gentlemen:

Please send me a copy of your booklet, "Valuable Facts about the use and care of Wire Rope."

Name.....

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AMERICAN STEEL & WIRE COMPANY, GENERAL OFFICES: CLEVELAND, OHIO

COLUMBIA STEEL COMPANY, SAN FRANCISCO

TENNESSEE COAL, IRON & RAILROAD COMPANY, BIRMINGHAM, SOUTHERN DISTRIBUTORS

UNITED STATES STEEL EXPORT COMPANY, NEW YORK

AMERICAN TIGER BRAND WIRE ROPE

Excellay Preformed

UNITED STATES STEEL



Earth-Movers Star In Soil Conservation

(Continued from preceding page)

some cases. He builds dams in the more serious ditches, so that they will be filled with silt, before he builds a waterway. Ditches 12 feet wide and 12 deep are not uncommon among his jobs.

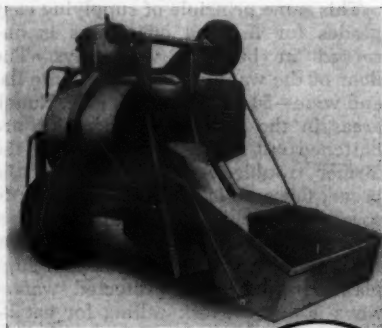
In his 17 years in soil conservation, Cornish has worked closely with Soil Conservation Service representatives. He has built some 2,000 small dams in gulleys, many waterways, and many complete systems including terraces and waterways. Starting on his own 800-acre farm, he extended his activities to the adjoining 1,200-acre farm of his brother, Phillip A. Cornish. Later he did work for neighboring farmers, who were impressed by the results he had obtained on his own land. Today, Cornish has more requests than he can handle from farmers in the area who want him to put protective systems in their fields.

Damming Gulleys

Damming gulleys to halt erosion, as practiced by Cornish, has two objectives: to retard the water flow and thus halt further damage; and to retain, behind the dams, the silt being washed away. Dams are built down the gully in a series, approximately 100 feet apart on the average. Spillways are put in to allow the water to pass from dam to dam on its way off the field.

This is the procedure used in dealing with severe gulleys, such as may be found where adjoining fields slope steeply to meet in a sharp V. Other gulleys, where erosion has been unchecked too long, are so large that the cost of immediate filling would be prohibitive. It is most practical in either case to construct dams and let the silt build up until it fills the gully. Cornish generally plans on building a waterway as the final step in controlling a gully.

Sometimes, however, a ditch is too big for eventual conversion to a grassed waterway. It is dammed merely to slow down the water and prevent the gully from becoming a small canyon. Such cases call for filling in smaller gulleys leading to the main one as watercourses. Occasionally a small diversion dike is found advisable. This shunts water onto a protected path while a gully is dried out, then dammed or filled.



HEAVY-DUTY HALF BAGGER with Power Loader and Tank



THIS mixer gives the smaller contractor every production advantage found on larger mixers. Output is increased because high shoveling is eliminated. Automatic water measurement, rapid discharge, and Briggs & Stratton air-cooled engine insure perfect performance. Capacity 3½ cu. ft. mixed concrete, plus 10% overload.

Write for prices and specifications

MULLER MACHINERY CO., Inc.
1100 WHITMAN AVENUE
METUCHEN, NEW JERSEY

Tilters, Non-tilters, Plaster Mixers,
Concrete Carts, Mortar Boxes



A Bucyrus-Erie scoop and International TD-18 start bringing this 80-acre alfalfa field to grade for drainage by Brown Brothers of Cozard, Nebr.

Building dams, Cornish's bulldozers cut down to solid ground on the sides and bottom of the ditch, to get a firm base. Moist, gummy subsoil, closely packed, is used in constructing the fill. A 3 to 1 slope on the uphill side of these dams, and a 2 to 1 slope on the downhill side, are required by government

specifications.

As the subsoil fill is built up, it is compacted by walking the TD-14's across. When the dam has been brought up to the height of the top of the ditch, a crest is added to allow for inevitable settling, and the spillway is put in.

Silt builds up behind these dams

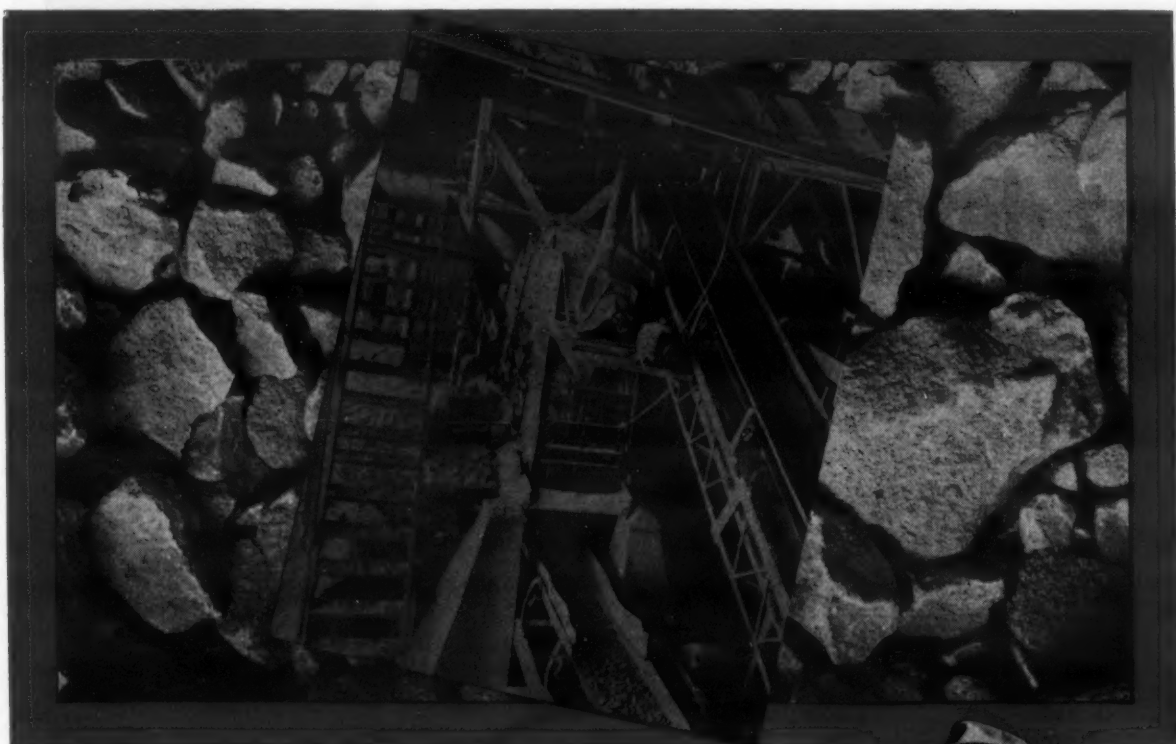
very quickly; in fact, the rapidity with which gulleys are filled by this method is clear indication of the need for and value of soil-conservation practices. A gully 12 feet wide and 12 deep can be completely filled by silt within a year after dams are put in.

The dams are then broken, and a watercourse is built down the former ditch. Working down the slopes and back and forth across the fill, the tractors compact the dirt. As a final step, it is packed still further by a land roller.

Planting

After a waterway has been completed, either by immediate filling or by first damming, then filling, the farmer disks the area lightly and plants brome grass and alfalfa. Because sterile subsoil has necessarily been brought to the surface in the work, the first growths of vegetation will not be thoroughly effective in halting damage.

In the first two years, small erosion (Concluded on next page)



Above photos show New Holland Double Impeller Breaker installation at Hudson Stone Products Company; also . . . actual size material as it comes from delivery conveyor before screening. Notice uniformity of shapes and sizes. This is the result of "Dual Impact" action! Breaking force evenly distributed assures accurate sizing without irregular shapes—even with slabby material!

In limestone . . .

"Crush more material to desired size with less power"

● Early in 1947, Tom Hudson modernized his plant. He replaced three units with a single New Holland Model 3030 Double Impeller Breaker.

From the layout of his plant which is indicated above, you can easily see what Mr. Hudson means when he says . . .

"A one-crusher plant can be successfully built around this crusher (the New Holland Double Impeller Breaker) . . . which permits a minimum of other

equipment . . . contributes materially toward low maintenance."

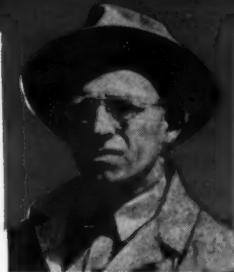
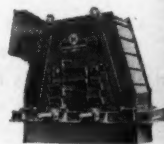
In pits and quarries all over the world, "Dual Impact" action is producing outstanding results.

The record is the same . . . higher production at lower cost . . . in limestone, basalt, granite, gravel, and many other types of stone.

New Holland Double Impeller Breakers are available in four sizes—1212, 2020,

3030, 5050—to meet your requirements. They can be adapted easily to either an open or a closed circuit.

Whatever your crushing problems—bring them to New Holland engineers. They will help you as they have helped so many other operators. Write Department C-59 today.



says
TOM HUDSON, owner,
Hudson Stone Products Company,
Lynchburg, Ohio



NEW HOLLAND DOUBLE IMPELLER BREAKERS

NEW HOLLAND MANUFACTURING COMPANY, MOUNTVILLE, PA.

rills may be formed in the waterway. These are quickly and easily filled with cobs and manure, or a similar mixture that will form a tough mat, and packed with dirt. By the third year at the latest, the vegetation will be thick and hardy.

This growth of alfalfa and grass will withstand the water successfully. Much water will be retained, soaking into the ground; the balance will pass harmlessly over the thick deep-rooted vegetation. The former wasteland will have been returned to the condition it was in before erosion began.

Equipment, Costs

Varying requirements of different farms make it difficult to generalize on the cost to the farmer of soil-conservation work by heavy equipment, or the effectiveness of the systems installed. Contractor Frank J. Johnson of Omaha, Nebr., estimates the average cost of a system built with motor graders at from \$10 to \$14 per acre. The slope of the land, number and length of terraces, and amount of filling required for erosion ditches, affect the cost. Johnson has a fleet of five International-powered Adams motor graders doing this type of work. Farmers are charged by the hour for work with this equipment.

Cornish has used crawlers with dozer blades for most of his past soil-saving work, but he, too, has found that motor graders are more efficient for building terraces. He is now forming two equipment teams, each having a TD-14 with dozer and a motor grader, to meet the demands for conservation work by farmers in the area. Each team will be able to install a complete protective system, the tractor damming or filling the ditches and the motor grader building terraces. Cost to the farmer will be approximately \$10.00 to \$11.00 per hour for each machine.

Other Nebraska contractors have used motor graders exclusively in eliminating gulleys and constructing terraces. Some are now planning to get bulldozers for the heavier work on erosion ditches. This team-of-equipment method is a new development that promises to increase the speed and efficiency of earth-moving to save the soil.

In Nebraska the working season for soil conservation is short: from the first spring thaw until early planting, and from the end of the combining season until the first heavy autumn frost. For the balance of good weather, motor graders are profitably employed by the contractors on county and farm roads. Cornish keeps his tractors busy on county road work, and in excavating basements, digging farm stock ponds, and clearing hedgerows and land for the farmers.

Contractors throughout Nebraska are also busy preparing new land for production and improving fields already under cultivation. Crawler tractors and scrapers level fields to be irrigated. Brown Brothers Co. of Cozad keeps three International TD-18's busy with 4-wheel scrapers and land levelers on improvements for farmers in that area.

Bulldozers clear trash from unproductive land. Farm tracts worth about \$35.00 per acre can be increased in value to nearly \$200.00 per acre by clearing worthless secondary timber and other growths, and by leveling.

Winter, when most farm-development work is halted, is the time for land clearing. In an experiment last winter, Albert Cornish cleared 20 acres of brush at an average cost of \$2.00 per acre with his two TD-14 crawlers. He plans to do such work on a larger scale this year.

R. G. LeTourneau Changes

Four men have been appointed to west-coast sales positions by R. G. LeTourneau, Inc., Peoria, Ill., and a district sales representative has been named for the middle-eastern United States and eastern Canada. George

Wacker is named Assistant to the Western Sales Manager of the Oakland, Calif., office. George Goettsche is named Sales Representative for a new factory branch established in Oakland. A. W. Travis is named District Sales Representative for Oregon, Washington, British Columbia, Canada, and the territory of Alaska. He will make his headquarters in Portland, Ore. L. D. LeTourneau is named Special Products Representative in the northwest part of the United States. And George C. Summers is named District Sales Representative for Kentucky, Michigan, Ohio, Ontario, and Quebec. His headquarters are at Columbus, Ohio.

Unveils 550-Hp Diesels

A new 550-hp diesel engine was unveiled at a special press preview held recently by the Cummins Engine Co., Inc., Columbus, Ind. According to Cummins, this is the most powerful high-speed diesel engine in production. Present at its preview were editors and

writers from newspapers, press associations, business journals, etc.

In addition to showing off its new engine, Cummins played the good host. It held a luncheon for the press at the Donner Park Community Center, followed by a tour of the Cummins pro-

duction and experimental departments. The day's festivities were concluded with a dinner at the Indianapolis Athletic Club.

Complete information on the new NVHS-1200 Cummins diesel will be found in this issue on page 21.

A MILLER Tilt-Top is BUILT TO TAKE THE LOAD



Shown is the Model B 10-ton heavy duty trailer

IMMEDIATE DELIVERY
Chassis, platform, tires...\$975.00

Optional Equipment Includes . . . Hydraulic Tilt Control
Two Speed Winch Electric Brakes

RAY MILLER RESEARCH ENGINEERS
DEPT. 359 MILWAUKEE 9, WISCONSIN

Miller time tested and proven trailers are REALLY built to take the load. The model B is known from coast to coast for dependability and ruggedness. Miller features an oak platform on an all welded frame, 16" deep at center with Budd hubs and wheels. Miller superior construction and fine engineering make it the safest and most dependable trailer on the road.

For EXTRA performance... Roebbling Preformed

Costs least—because it lasts longest

"THERE'S THE ROPE for my money," says a contractor speaking of Roebbling Preformed "Blue Center" Steel Wire Rope. And his first choice is the first choice of more and more construction men everywhere. Preformed "Blue Center" has the dollar-saving characteristic of setting new performance records. It brings fewer shut-downs; cuts your replacement time. Even severe bending, small sheaves and reverse bends find it fatigue-resistant and going strong after ordinary ropes have failed.

EASIER AND FASTER TO HANDLE. Besides these advantages, Roebbling Preformed has almost no tendency to set or kink...and that makes it easier to handle and install. It saves still more time because you can cut it without seizing, and apply fittings readily. In operation, Preformed is superior, too...practically free from vibration and whipping.

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ROEBBLING

A CENTURY OF CONFIDENCE

All-Electric Control For 2½-Yard Shovel

All-electric controls mark the 93-M shovel introduced by the Marion Power Shovel Co., Marion, Ohio. Designed as a sister model to the 93-M diesel, it has a 2½-cubic-yard dipper and a 28-foot boom. The electric controls are said to provide smooth, easy, cushioned operation.

The swing machinery is powered by a separate vertical motor which is mounted on the upper frame structure and direct-gear through two intermediate shafts to the main swing shaft. The hoist machinery is also powered by a separate motor, first through a silent chain reduction to the intermediate shaft, and then through a single gear reduction to the drum shaft. The crowd-machinery motor is geared through an intermediate shaft to the shipper shaft.

The motor-generator set on the Marion Model 93-M Ward-Leonard shovel consists of an exciter and an induction driving motor direct-connected to three in-line dc generators. All are mounted on a self-supporting base. Each generator is of the Ward-Leonard type designed for variable-voltage control. The motors are of the mill type and are said to possess low armature inertia and high over-load capacity. They are 600-line shunt-wound units and are especially designed for fast reversing service.

Other features claimed for the unit include: simplicity of machinery design and construction for easy maintenance and adjustment; welded upper and lower frames for maximum strength and rigidity without bulky weight; permanently positioned axle and shaft bearing supports for positive



All-electric controls mark the 93-M Ward-Leonard shovel just announced by Marion Power Shovel Co., Marion, Ohio. It has a 2½-cubic-yard dipper and a 28-foot boom.

alignment; moving parts fitted to close tolerances for smooth operation and long life; conveniently arranged and simply designed operating control equipment; and all-welded box-section boom made from formed plates having rounded corners for greater strength.

Further information may be secured from the company, or by using the Request Card at page 16. Circle No. 96.

A 7-CFM Compressor

A new lightweight air compressor is announced by the Davey Compressor Co. of Kent, Ohio. Known as the Little Workhorse, it has a capacity of 7 cfm and weighs 7 pounds. Continuous operating pressure is listed at 100 pounds, but the manufacturer explains that the unit can be run intermittently at

pressures up to 150 pounds.

The Little Workhorse is powered by a 4½-hp air-cooled gasoline engine

direct-connected to the V-type 2-cylinder single-stage compressor. The compressor has a 2½-inch bore and 1¼-inch stroke, and operates at 3,000 rpm. The unit is equipped with an automatic clutch, centrifugally actuated, which is designed to free the engine from the compressor for ease in starting, but to re-engage automatically at about 1,500 rpm.

The manufacturer points out that the Little Workhorse will operate in a temperature range of minus 65 to plus 130 degrees F. Its dimensions are as follows: length, 29 inches; width, 21 inches; and height, 27 inches.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 26.

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M. R. Butler, Jr., has been appointed General Plant Superintendent by the Butler Bin Co. of Waukesha, Wis. He will also continue to serve as Advertising Manager.

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Est. 1870

Why Safety Programs? Because They Pay Off

Dividends Include Lower Insurance Rates, Better Work, a Clear Conscience; So Let's Lick Accidents

By MERVYN G. GASKIN, President, Taylor & Gaskin, Inc., Detroit, Michigan

WE ask the question, "Why a safety program?" The answer: "Because it pays". A safety program pays big dividends to all of us in cash and in a clear conscience. It pays in the lower cost of insurance, which is a part of our overhead. It pays in the preservation of our machinery and equipment. It pays because we are able to get more and better work from our men when they know that we have their interests at heart, that we are trying to protect their lives every minute of the day. It pays in our relations with our customers, for they know that we are trying to protect not only our own men, but their employees and their property as well.

A year and a half ago our company was sued for \$500,000 on a fire loss. We won, as we showed that we had done everything in our power to protect the property of the owner. We did this through giving our foremen safety instructions in fire prevention. If we had lost this case, it would have ruined our company, and the same might apply to many of you.

You contractors are resourceful. You have to be. No two jobs are alike; there is no set formula. But if you have a problem, you lick it immediately. Why not apply the same principles to accident prevention? One contractor, for example, has meetings every week to check his costs and see how he is making out; if any one part of the job is going haywire, he immediately plugs the leak. Why then shouldn't we all do the same thing in accident prevention?

Let's Look at the Record

As Al Smith used to say, "Let's look at the record"—in terms of accident frequency and severity rates. The frequency rate is the number of disabling injuries per million man-hours of exposure. The severity rate is the number of days lost per thousand man-hours of exposure, including charges for permanent disabilities and deaths.

According to figures published by the National Safety Council in its 1948 edition of "Accident Facts", steel erection has a higher frequency and severity rate than all mining except anthracite mining. And even compared to anthracite mining, steel erection has a higher severity rate. In fact, the construction industry as a whole killed two and one-half times as many people in 1947 as mining did.

The average accident frequency rate for all industries is 12.95; the average severity rate is 1.27. The frequency rate for steel erection is 59.95, or almost 500 per cent worse, and the severity rate is 12.59, or almost 1,000 per cent worse than the average. General building construction has an accident frequency rate of 31.99 and a severity rate of 2.09, so it is 250 per cent worse than the average of all industries in frequency and twice as bad in severity.

In 1947 the construction industry as a whole was 34th out of 40 in severity rating. Approximately 150,000 men were disabled; 2,400 of these workers died, and about 4,600 were left some form of permanent physical impairment, such as the loss, or permanent loss of use, of some part or function of the body. This means that 1 out of 16 suffered an injury and 3 out of every 1,000 were either killed or suffered permanent disability.

Let me quote from the March, 1948, issue of "Construction", a publication of the United States Department of Labor, Bureau of Labor Statistics:

"The humanitarian and social implications presented by this large volume of injuries are immeasurable. From the economic viewpoint alone, however, it is clear that these injuries constitute a very large expense item which must be absorbed by the industry. The actual time lost by construction workers in 1947 because of work injuries experienced in that year is estimated as about 3,300,000 man-days. On the basis of current average hourly earnings for construction workers, this would represent a direct loss of \$46,200,000 in wages alone."

(Continued on next page)

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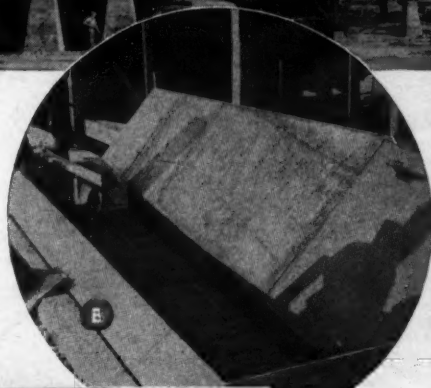
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Although planned to produce about 90-100 tons per hour of minus 1 1/4" aggregate, this plant regularly hits as high as 125 tons hourly when producing this and smaller sizes.

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Why Safety Programs? Because They Pay Off

(Continued from preceding page)

"The time lost in 1947, however, does not adequately measure the real loss resulting from these injuries. Many of the seriously injured workers will find . . . their earning ability . . . reduced for the remainder of their lives, and for those who were killed, the loss is equivalent to their entire expected earnings during [the rest of a normal working life] . . . If additional allowance is made for the future effects of the deaths and permanent impairments included in the total, the economic time loss chargeable to the injuries experienced in 1947 would amount to about 24,100,000 man-days. At current earning levels this would represent a loss of \$337,000,000 in present and future earnings, all of which must be absorbed by the employers, the workers, their dependents, and the consumers."

What Can We Do About It?

Evidently we can do a great deal, if we will, to improve the construction industry's high injury record. According to "Accident Facts", the best no-injury record in the construction field was a job of the du Pont Co. at Belle, W. Va., where 3,582,134 man-hours were worked without a disabling injury. And we find that this same company holds the record in the textile industry with 18,871,795 man-hours without a disabling injury, the chemical industry with 16,109,608 man-hours, and iron and steel products at the Remington Arms plant with 10,165,400 man-hours. Evidently du Pont knows how to prevent accidents in any field. The answer is simple. It has a safety program. It finds it pays. It practices safety, and makes the contractor practice it.

We all know that in the majority of cases the large jobs have better safety records than the smaller ones, for the simple reason that there are safety engineers watching these larger jobs. Again a matter of cost. If the contractor didn't have safety engineers on the job, you may be sure the insurance companies would, to protect their interests and lower their costs.

One general contractor with jobs in 14 locations shows 423,800 man-hours worked with one lost-time accident—10 per cent of the frequency of the national average. We notice also a job well done by the Constructors Association of Western Pennsylvania. According to its December, 1948, bulletin, the Association's compensation rate on highways and streets was \$7.00 in 1935 and dropped to \$2.38 in 1948. The bulletin also contains a highly complimentary letter from the council of the union involved, pledging its full support in safety and accident prevention.

Inattention Is to Blame

Let's again refer to a statement in the United States Department of Labor publication "Construction":

"A high degree of hazard is admittedly present in construction work. Most construction hazards can be overcome, however, through application of safety principles. Fundamentally, the accident record of the construction industry is more indicative of inattention to safety principles than of the inherent hazards of the work.

"Evidence to support this conclusion is apparent in a comparison between the injury frequency rates of private contractors engaged in work for the Corps of Engineers of the United States Army and of those engaged in non-Federal work. The standard contract for work under the Corps of Engineers specified that safety supervision must be provided, and the specifications for the work outline basic measures for controlling known accident hazards. Enforcement of these provisions by

inspectors of the construction forces of the Corps of Engineers has consistently resulted in much lower injury frequency rates for work under their jurisdiction than has prevailed in other construction work."

These figures show that the work supervised by the Corps of Engineers was from two and one-half to three and one-half times better in accident frequency. Do you realize what this statement means? It registers but one thing in my mind, and that is legislation. In other words, if we don't improve our safety records, the Department of Labor can show us how. The boys down in Washington don't even need to look for the reason or excuse to step in. We've given it to them.

Results of One Safety Program

Several years ago, the Steel & Metal Erectors Association of Michigan, of which I was then President, was alarmed about its compensation-insurance rates and the frequency and severity of its accidents. Taylor & Gaskin,

in particular, was greatly interested, as it had to pay a rate set up by the Compensation Bureau, in accordance with the experience rating of the steel-erection industry in Michigan.

In 1943 the Bureau rate for structural-steel erection was \$31.57 per \$100 of payroll. Our company had a debit rating of 14 per cent so our rate was \$36.00. Some of our competitors, who were self-assured, did not pay these rates. They had definite safety programs and safety rules and regulations. They were using in that year a rate of approximately \$7.00 against our \$36.00 per \$100 of payroll, an advantage of \$29.00 per \$100 of payroll over us. When overhead and profit were added, it meant a difference on the average steel-erection job of \$5.00 per ton. What chance did we have of competing against them? Something had to be done.

Our Association organized, through the Detroit Industrial Safety Council, affiliated with the National Safety Council, a series of dinner meetings on safety, to which we invited manage-

ment, supervisors, and all foremen engaged in steel erection in our area. Our results were instantaneous.

The companies attending these meetings do not have to be members of our Association or of the Safety Council. We ask each one to pay the cost of the dinner for all of its representatives. We plan the programs. We have specialists in their fields address us on the safe use of our equipment, safe ways to work, fire prevention, first aid, etc. We conduct five meetings a year on definite dates. We keep a record of our attendance, and previous to each meeting we send a postcard to the home reminding everyone of the meeting.

At these meetings we discuss mutual problems. We stress the cost to our men in the possible loss of pay and in union assessments paid to their members due to accidents. Nothing but safety and accident prevention is ever discussed, and all of our discussions are sincere and earnest. There is a definite desire on the part of our supervisory

(Continued on next page)



Utility-size TRENCHER on rubber

Here is a mobile, utility-size trencher — Parsons rubber-tired Model 80 Trenchmobile — for handling off-street connections, installing conduit, gas lines, water services, in new subdivisions, on airport maintenance, etc. All those small, tedious trenching operations formerly done by slow, costly hand methods can now be handled in much less time, at less cost, and less supervision with this one-man operated Trenchmobile. Opens new profit possibilities to small contractors . . . fills an important need in speeding up schedules of public utilities and municipalities.

TRAVELS A MILE IN 4 MINUTES

This revolutionary pneumatic-tired Trenchmobile goes anywhere under its own power . . . over city streets . . . through traffic . . . down the

highway at road speeds. No waiting for truck or trailer. You just drive it away . . . travel a mile in less than 4 minutes! Gets there faster . . . gets to work sooner . . . finishes quicker.

HANDLES MORE JOBS PER DAY

Trenchmobile's wide range of traveling and trenching speeds gets more jobs done per day. Cuts smooth-walled trenches in the toughest digging . . . special crumb attachment provides clean trench bottom. No costly hand trimming. Over 40 years of Parsons trencher engineering experience has gone into its rugged, heavy-duty design . . . trenches up to 4-feet deep, 5" or 7½" wide. Check what its many exclusive features can mean to you . . . then see your Parsons distributor for complete facts, or write for illustrated bulletin.



PARSONS Trenchmobile

MANUFACTURERS OF 4 BIG HEAVY DUTY TRENCHLINES® FOR YOUR MAJOR TRENCHING

employees for information on accident prevention. Anyone who has ever attended these meetings will attest to these facts.

After an address, we have a discussion period which is the most important part of the meeting and the most fruitful. Our men make suggestions and criticisms, sometimes with very effective good-natured kidding—as when one of our foremen appeared with a knob the size of a billiard ball on his head; we found he had been hit by a crane block when he wasn't wearing a hard hat. We have a committee to investigate serious accidents and to act on suggestions. All serious accidents are reported and discussed at each meeting.

At our meeting last December, four serious accidents were discussed—two deaths, one permanent disability, and one partial disability. Upon investigation we found that in each of these cases the companies involved and the foremen on the job had never participated in any of our meetings. Naturally they were invited at once. You see, we

have to pay for their accidents. Why? Because our insurance rates are set on the cost of all accidents.

The foreman holds a job meeting the day after our meeting, and explains to his gang what he has learned the previous night. Sometimes we suggest he hold weekly meetings, for about 10 minutes on a Monday morning, to give some safety suggestions to the men. They inspect all equipment.

Our company sends to each foreman, at his home once a month, a report showing his experience, number of hours worked, accidents if any, total lost time, and cost, with some explanations and words of encouragement. Believe me, the foremen watch these reports very carefully. No one wants his record marred.

The monetary results have been remarkable. The compensation rates for riveted steel erection have decreased in the state of Michigan from \$31.57 in 1943 to \$12.11 this year (in which they gave us the maximum allowable reduction of 25 per cent from last year). In

other steel erection the rates have decreased from \$15.62 in 1943 to \$4.92 this year, and these rates will keep on going downward, as they are predicated on 1944 to 1946 experience.

The remarkable feature of these statistics is the fact that in the year 1940 our total payroll amounted to \$166,400 with 5 serious accidents and 39 non-serious, and with total losses of \$46,461—as against 1946, when we had a payroll of \$980,000, one serious loss, 32 non-serious, and total losses of \$38,683. In other words, a 600 per cent increase in payroll and a 20 per cent reduction in losses. Remember, this is the worst portion of our industry, as the best employers are self-assured and their payrolls and accidents are not included.

Our company had a 5 per cent credit on a base rate of \$28.95 in 1944, a 26.1 per cent credit on the lower base rate of \$17.57 in 1947, and a credit of 42.1 per cent on a still lower base rate of \$12.11 this year. This means a net rate of \$7.01 for steel-erection insurance as

against \$36.00 in 1943—a saving of \$29.00 on every \$100 of payroll. In 1947 we had a refund of \$16,400, and in 1948 a refund of \$18,700. The reduction in compensation rates for steel erection means a savings of \$583,800 to our industry in Michigan on a payroll of approximately \$3,000,000. This is a part of what we have accomplished through our program in a period of four years.

We think these results are really worth all the time and effort we have expended. Our men are safety-conscious, and we are determined to keep them that way. But we of the local structural-steel industry cannot do the job alone.

A Job for Everyone

Our own section of the construction industry, together with all other segments of the industry, must do a similar job to produce a better safety record for the industry as a whole. This must be done through our own cooperative efforts, otherwise we will be forced into a program through legislation, restrictive measures, and safety codes arising from sources over which we have little or no control. You may think this an idle threat, but we need only consider what has happened in social legislation in the past few years. We may be told what types of scaffolds to use, from whom to buy our equipment, how many men we shall use on a piece of equipment, and how many men it requires to do a job. It is of little use having just one section of the industry safety-conscious. We know in our own industry that a great many serious accidents could have been avoided if other trades had worked with us in accident prevention.

There was a bricklayer, for instance, who was told not to work around our steel erection. The foreman told him the job had to be done, to go ahead and do it. He was hit on the head by a piece of steel and lost a part of his brain.

A steel erector was disabled because of the faulty setting of anchor bolts. A contractor thought it was easier to cut off the anchor bolts and pour concrete around them than to knock the concrete out and pour new footings with the proper bolts.

During 1948 in one automobile plant in Detroit, four steel erectors were killed. In every case these deaths could have been prevented. In one case the widow sued the company for \$100,000. It was settled out of court for \$35,000. This can happen to any one of us, and it may mean the difference between a profitable and a very unprofitable year.

We argue a great deal with our employees about giving them a nickel or dime increase per hour. Yet here, in the case of steel erection, we have shown a saving of 20 per cent in insurance rates, or 50 cents per hour. It makes no difference whether it is in the man's wages or in insurance, it is still a part of the cost of the job.

In one state, the payroll for carpentry alone was \$90,000,000. If we made a saving of 10 cents per \$100 on insurance, it would mean \$90,000. One contractor told us his total payroll in 1948 was over \$10,000,000, so at that rate he'd save \$10,000. Again aside from the humanitarian angle, isn't this worth saving?

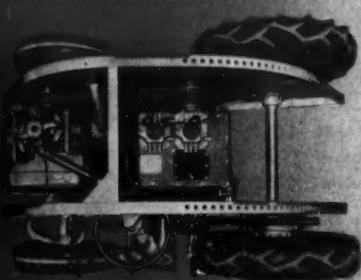
Safety Is More Than Posters

We need more effective control over our serious injuries. That is one of our industry's present problems. We can't sell safety by posting bulletins and posters at the job site. It may help, but we've got to do more than that.

First, management must be sold 100 per cent on safety. And in setting up its safety program, it must remember the old saying: "It is far more important to know what kind of patient has a disease than what kind of disease a patient has".

(Concluded on next page)

Model 80



FACTS AT A GLANCE:

- ✓ 4 TRAVEL SPEEDS to 18.5 m.p.h., plus 2.36 m.p.h. reverse
- ✓ 6 DIGGING SPEEDS from 2.16 to 13.22 ft. per min.
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MOTO-BUG has power forward AND REVERSE

Low-cost, big-capacity Kwik-Mix Moto-Bug gives you: Forward and reverse speeds from 1 1/2 to 4 m.p.h. Extra capacity per load . . . 10 cu. ft. (1200 lbs.). Easy handling . . . steers by hand-lever connected direct to rear wheel. Handy 33" width for close quarters . . . turns in own length. Standard-make 3.9 h.p. air-cooled gasoline engine. Platform body with stake pockets available.

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CENTRAL-MIX PLANTS with 100,000,000 yds. of experience

Over 100,000,000 cu. yds. of concrete have been poured by Johnson-engineered Central Mix plants . . . experience available to you for top efficiency. Central Mix Plant, illustrated, has 120-yd. Step-by-Step Bin . . . aggregate and cement elevators, storage silos, big 56-S concrete mixer. Ask about other Johnson sizes and types to fit your central-mix plant problems . . . large or small.

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KOEHRING 205 works on grade without blocking

Basement digging is a half-yard job. Koehring 205 breaks ground fast, works well on inclines because . . . Koehring traction brakes, controlled from cab, securely hold both crawlers without blocking . . . provide flexibility necessary to cushion brake assembly against operating shocks. Versatile half-yard saves time, money and increases production in many other ways. Write for catalog.

KOEHRING

COMPANY
Milwaukee 10, Wis.

Why Safety Programs? Because They Pay Off

(Continued from preceding page)

We study and become expert in all phases of safety except the one common to every serious accident—the human being. It's time we planned our safety programs as a part of human relations—not general programs, but ones that will appeal to each man directly and individually.

GM, for example, requires each supervisor to talk to two people individually every day about safety. He must keep a record of the person he talked to and what he talked about. He can take a minute, five minutes, or half an hour if necessary. No big meetings. No general stuff. Instead, strictly personal.

As in a football team where line men are taught, kickers are taught, and passers are taught, every man must be taught and trained in safety as it relates to him and to his specific job or operation. And he must be taught individually.

Though safety is largely a financial problem to management, it is a financial, emotional, physical, and social problem to the worker. And it is up to management to recognize this and co-operate by offering complete financial and technical help—and by selling a safety program to its workers.

Moreover, management and supervisors must be enthusiastic about safety. Today we do not think a superintendent or foreman is fully qualified for his job unless he has enthusiasm for accident prevention—unless he feels keenly his personal responsibility and the company's responsibility to its people.

A safety program is not something we can start and stop. It must be continuous, day after day, week after week, month after month. Sometimes it is very discouraging. We know of one contractor in Detroit who worked 18 months without a serious accident, and all of a sudden had three fatalities in a period of three weeks. This didn't discourage him in his program, though. He determined that something was haywire somewhere, and plugged the gap.

Recently this same contractor, on a Detroit Edison job, insisted on 100 per cent use of hard hats. If men didn't wear hard hats, they couldn't work on the job. And that applied to everyone—subcontractors, engineers, and supervisors. The owners accepted the

program and their men cooperated fully. Four probable fatalities and five serious accidents were prevented. This meant a saving of about \$95,000 in insurance costs.

Conditions have changed, so we can enforce safety regulations. Our rule should be "Do it or else", and it should apply equally to the general contractor and all subcontractors. Some contractors now have a clause in their contracts making the subcontractor abide by the regulations and decisions of the company's safety department.

In conclusion, it is my personal conviction that a planned safety program, incorporating the three E's—education, engineering, and enforcement—with thorough training and sustained follow-up, should be carried on by all sections of our industry. It should be directed by the AGC and its local chapters, and it should have the fullest cooperation of every contractor. It has been a definitely profitable undertaking for us, and we feel certain that you can obtain results that are as good or even better. If we don't do it, someone will do it for us. We have licked bigger jobs than this, let's lick this one too.

An address delivered at the annual meeting of the Associated General Contractors of America, Inc., March 2, 1949, New York City.

Mixer Tower Permits High-Level Discharge

A tower attachment to permit high discharge from standard concrete mixers is announced by Kwik-Mix Co., a subsidiary of Koehring Co., located at Port Washington, Wis. Designed for use with 11-S or 16-S mixers, it permits a maximum discharge height of 9 feet 2 inches. The manufacturer recommends it for pouring concrete directly into forms above ground level or into trucks.

The bucket carries a full batch directly from the discharge chute of the mixer to the top of the tower, where it is automatically discharged. Bucket travel and discharge are completed in the time the following batch is being mixed. A lever located on the operator's platform controls the special hoist mounted within the mixer frame and powered by the mixer motor engine. The hoist clutch disengages automatically when the bucket reaches the top of the tower.

The manufacturer points out that the tower loader does not hinder the mobility of the mixer; that it can be col-



Concrete can be discharged as high as 9 feet 2 inches with the new Kwik-Mix tower attachment designed for use with 11-S or 16-S mixers.

lapsed and positioned quickly, leaving sufficient road clearance; and that it can be moved on the job location without being collapsed.

Further information may be secured from the company, or by using the Request Card at page 16. Circle No. 92.

Calcium Chloride Supply Again Ample, Says Assn.

After a shortage for the last five years, calcium chloride is once more in adequate supply, announces the Calcium Chloride Association. This means that dealers can ship on short notice and users can again plan long-range projects. Much of the present tonnage is being used for highway construction and maintenance—highway ice control, concrete construction, dust-laying on dirt roads, and so forth.

Asphalt Inst. Names Mills

William H. Mills has been appointed District Engineer for the newly established Atlanta, Ga., office of The Asphalt Institute. The territory covered by this office includes the states of Georgia, Florida, Alabama, Mississippi, Louisiana, and Tennessee. Mr. Mills formerly was Chief of the Airport Division of the Civil Aeronautics Administration at Atlanta.

Athey MobiLoader
CUTS LOADING COSTS 50%

INCREASES PIT PRODUCTION 50%
— FOR MAY GRAVEL CORP., FT. WAYNE, INDIANA

The high-production "shuttle-cycle" of the Athey ML4 MobiLoader proves itself with dramatic results, in the May Gravel Corp. pit, Ft. Wayne, Indiana. This MobiLoader, with 1¼-yard capacity wide bucket, makes 3 passes per minute; loads 5- and 6-yard trucks in less than 2 minutes!

And the fast-moving Caterpillar D4 Tractor scoots from spot to spot in the ¼-mile diameter pit — to load bank sand, bank gravel or crushed stone, as desired. The firm has boosted its annual output of aggregates from 100,000 to 150,000 cubic yards.

"With the MobiLoader, we cut costs more than 50%, and increased production," states President William May. "We have saved again as much by eliminating truck-waiting. This machine will pay for itself in 6 to 8 months . . . has done what was expected of it."



The long-track D4 plus the MobiLoader's "track-center balance point" gives ample soft-spot flotation — assures traction for full-bucket loading . . . Ask your Athey-Caterpillar dealer all about the Athey MobiLoader.



ATHEY PRODUCTS CORPORATION, CHICAGO 28, ILLINOIS

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MOBILOADER

WELLMAN
Williams Type
Welded Buckets

Operators prefer the Wellman Bucket for its balance, easy handling, and digging power. Owners prefer the Wellman Bucket for its bigger payloads, lower maintenance cost. These features are not accidental. Wellman pioneered in welded construction of rolled steels which make these buckets lighter, stronger, for greater yardage at lower costs. In all types and sizes, you'll do better with a Wellman!

There's a Wellman Bucket for every service

THE WELLMAN ENGINEERING COMPANY
7012 CENTRAL AVENUE CLEVELAND 4, OHIO

Mile of County Road Is Built in Two Hours

A mile of road was built in two hours by the highway commission of Kearny County, Kans., using a fleet of five Caterpillar diesel motor graders.

The road runs between Highway 25, an oil-top road, and an elevated gravel road one mile west, at a junction 5 miles north of Lakin, Kans. It will be used by school buses to pick up children who could be reached before only by a circuitous route on the elevated gravel road.

In a coordinated cycle, the motor graders handled ditching, weeding, spreading, and grading of the new road at a level 6 inches above field level. Two No. 12 graders tended to pioneering, ditch cuts, and sod and weed-growth removal from the ditches. A No. 212 did the backsloping. A No. 112 picked up the ditch windrow thrown up by the No. 12's, and a No. 9 performed the final feathering.

The County used this same method to construct 60 miles of roads during 1948, and an additional 100 miles were constructed during the same period by variations of the method. Jasper Myler is Kearny County Engineer.

Feature of Diesel Is Interchangeability

A diesel-engine power unit has been brought out by the Harnischfeger Corp., Diesel Division, 100 Lake St., Port Washington, Wis. Special features of the new line are interchangeability of numerous parts and the patented P&H cylinder head and liner assembly. Other features claimed for these 2-cycle units are medium and high crankshaft speeds combined with satisfactory piston speeds, and an overall light weight for a solid-injection supercharged diesel engine of this type.

According to the manufacturer, all parts are interchangeable from one model to another except for the crankshaft, camshaft, crankcase, and other parts which are necessarily different due to the added number of cylinders. The fact that each cylinder is an independent, fully water-jacketed unit provides a saving in time when maintenance is required, the company points out.

The P&H diesel engines have a bore of 4.5 inches, a stroke of 5.5 inches, and a displacement of 87.5 cubic inches per cylinder. All pins and journals are drilled for continuous pressure lubrication. The camshaft is made from a heat-treated alloy-steel forging. The large-diameter camshaft bearings are pressure-lubricated.

Further information may be secured from the company, or by using the Request Card at page 16. Circle No. 111.

Contractors Hold Election

W. E. Crawford, President of George Vang, Inc., is the new President of the Constructors Association of Western Pennsylvania. He succeeds Dan Dinardo, President of Dinardo, Inc. The election was held in conjunction with the annual dinner and business meeting of the Association at the William Penn Hotel in Pittsburgh. J. E. O'Leary

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Mfrs. of Sterling Transits & Levels
136 N. 12th St., Philadelphia, Pa.



Five Caterpillar diesel motor graders teamed up recently to build a mile of road in Kearny County, Kans., in two hours.

succeeds Mr. Crawford as Vice President of the Heavy Division, and Roy

F. O'Mara was reelected Vice President of the Highway Division. Mr. Dinardo

takes over the duties of Treasurer, and Russell C. Swank is the new Secretary. Wm. R. McQuade is named Assistant Secretary.



"ROLLS WITH THE PUNCH"

of **BUCYRUS-ERIE** Bullgraders-Bulldozers

The rolling action you see here is a result of two recognized features of Bucyrus-Erie Bullgraders and Bulldozers: (1) Perfect balance between B-E equipment and the tractor; (2) The scientifically curved B-E blade.

Whether you use cable or hydraulic control this is a one-two punch combination that really peels the dirt off in a smooth easy roll—gives you faster, cleaner earth-moving on the job. Watch a Bucyrus-Erie outfit on a hill or side slope and see how balance keeps it level—without nosing down. Watch it perform in sticky mud or loose sand.

Your International Industrial Tractor dealer can give you the full story on why more dirt "rolls with the punch" of a Bucyrus-Erie Bullgrader or Bulldozer.

BUCYRUS-ERIE CO., So. Milwaukee, Wis.

MORE REASONS WHY BUCYRUS-ERIE UNITS HIT HARD AND FAST

- Blade mounting allows free track oscillation without changing blade angle.
- Bullgrader blade angled or tilted in few minutes by one man.
- Box girder frame plus flame hardened weldments give great strength.
- Proper sheave alignment for long cable life.
- Operator has clear vision in sitting position.
- New power control winch means easier operation.
- World-wide service through International dealers.

See Your INTERNATIONAL Industrial Tractor Distributor

Eighth Short Course On Roadside Problems

Wide Variety of Subjects Covering Many Phases of Roadside Development Are Discussed at Columbus

+ THE Eighth Annual Short Course on Roadside Development, sponsored by Ohio State University and the Ohio Department of Highways, was held in Columbus, Ohio, March 23-26. The largest registration yet recorded at these meetings, 257, included landscape engineers, highway engineers and officials, contractors, and others interested in roadside development from 25 states, the District of Columbia, and Canada. In addition to near-by states, such far-away places as California, Oregon, Colorado, Massachusetts, Connecticut, Louisiana, and Mississippi were represented.

Education and Training

Following welcoming remarks by Dallas D. Dupre, Jr., Landscape Architect, Ohio Department of Highways; Professor Charles R. Sutton, Department of Landscape Architecture, Ohio State University; and Dean Charles E. MacQuigg, College of Engineering, Ohio State University, the first session was given over to the subjects of education and personnel training.

Educating and training the undergraduate was discussed by George J. Albrecht, Professor of Landscape Engineering, Department of Landscape and Recreational Management, New York State College of Forestry, Syracuse University. Professor Albrecht pointed out that today there is a general reappraisal of the objectives of higher education. It is a natural aftermath of a great war to reexamine all the routine procedures of life, he said, and especially education, which is preparation for life. In addition, the number of people in schools and colleges is so great at present that all may not be able to practice in their chosen fields of specialization. The professional school must therefore give to students something beyond specialized training, said Professor Albrecht. Prospective employers want young college graduates more versatile, with a broader education. They need basic facts and skills, but also working brains and the ability to advance in responsibility.

A college education should, in Professor Albrecht's opinion, provide for the acquisition of technical knowledge, the stimulus to thinking, and a sound attitude towards society and service to society. The training of a landscape architect or engineer should enable him to think clearly, quickly, and with vision; to plan on paper; to collaborate with others. He needs a knowledge of sociology, of aesthetics, and of land use. In the last analysis, the objective of all education should be to train better citizens.

In-Service Training

The in-service training program of the New York State Department of Public Works was described by Nelson M. Wells, Principal Landscape Engineer of the Department. The purpose of this program, Mr. Wells said, is twofold: to increase the efficiency of Department employees and prepare them for advancement; and to give them a broader picture of the work of the Department and of new developments. The first year of the program was broad and comprehensive, he said, with Bureau heads serving as faculty. Administration, public relations, safety, and similar subjects were covered. Top-level personnel appeared before every employee. Subsequently, engineers with

the same interests were grouped together for sessions devoted to their particular work—construction, maintenance, roadside development, accounting, etc. The sessions consist of a prepared paper, followed by discussion and questions. The latter, Mr. Wells said, have been most interesting and valuable.

The roadside-development phase of the program consisted of two parts: highway design and construction, given in general terms and directed towards assistant engineers; and highway maintenance, at the same level. Mr. Wells gave some excerpts from one of his lectures, and showed some of the slides used with it.

In addition to this general in-service training, two special courses have been given. One was for training tree men in the techniques of tree pruning and care; the other was in soil mechanics.

Highways to Good Speech

An interesting departure from the usual type of subject at such meetings was presented by Professor Franklin H. Knowler, Department of Speech, Ohio State University, who spoke on "Main Highways to Good Speech". Since speech is a means of communication, Professor Knowler said, good speech should be given the same attention we have given to the development of our modern highways from former cowpaths. Highway engineers are public servants. They need the support of public opinion to carry on the highway program. It is therefore essential to good public relations that they be able to give information clearly and interestingly and enlist that vital public support by means of good speech.

Professor Knowler drew an interesting analogy between the construction of a highway and the preparation of a good speech. First, there must be a plan. Many people get lost in the process of communication, he said. It is essential to decide on your purpose: to inform, to develop a conviction, or to make people think. Highway terminals are a part of a highway plan. So with a speech—there must be a beginning which establishes contact with the audience and arouses their interest. And

there must be an end. Perhaps nothing is so essential to a good speech as to know when to sit down.

Then there are the construction materials. One does not have to be an expert to make a speech, but material is as essential in speaking as in building a road. This material comes from reading, from conversation, from reflection,

and from personal experience. Next is presentation. Good ideas are not always self-evident, but instruction can be made interesting through the use of personal narrative, human interest, vivid presentation, and an appeal to the senses.

The next element of a good speech is (Continued on next page)

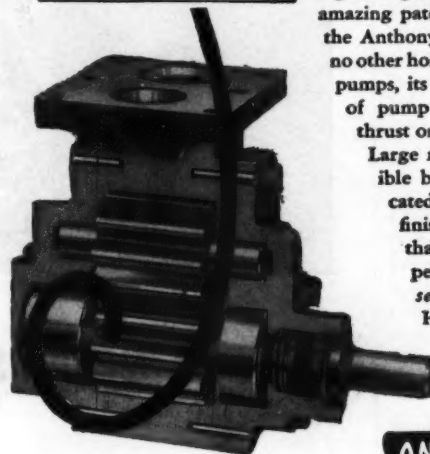
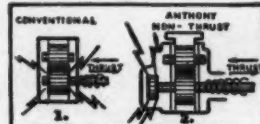
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last longer?

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THE HEART of a dump truck—the pump—plays as important a part in the operation of a dump truck as your heart does to you. And when the pump fails, the hoist fails and the truck stops working. That is why Anthony engineers place such emphasis on the pump. The amazing patented "NON-THRUST" design of the Anthony roller-bearing pump is found in no other hoist at any price. Unlike conventional pumps, its design eliminates the No. 1 cause of pump failure—destructive mechanical thrust on the gears. (See drawings below.)

Large roller bearings, extra thick reversible bronze wear plates, pressure lubricated idler gear bearings and precision finished steel gears are other features that give this pump an unequalled field performance record. For dependable service **DEPEND ON ANTHONY HYDRAULIC HOISTS with the "NON-THRUST" Pump.**



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- CAPACITY:** Up to one ton per minute
- POWER:** Wisconsin or Equal Gasoline Engine 12 H.P. Air-cooled
- PROPORTIONING:** Variable volume Roller feed for aggregate. Variable volume pump with micrometer manual control for asphalt
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language. Don't let grammar get in the way of making a point, Professor Knowler said. Avoid artificiality and pedantry. Remember that a good speech is not an essay on its hind legs. A good oral style requires short sentences, rhythmic structure, clearness, and conversational tone. And finally comes the development of speaker personality. Practically everyone about to make a speech is nervous. There are several ways to overcome this. Preparation is basic. Know how to do the job as well as you can. Know yourself and know human nature. The most highly socialized people are the best speakers, so get to know and like people.

Dinner Session

Presiding at the dinner session was T. J. Kauer, newly appointed Director of the Ohio Department of Highways. The speaker was Ben H. Petty, Professor of Highway Engineering, Purdue University.

Professor Petty stressed the need for better public relations. He pointed out our dependence on highways in every aspect of our daily lives. We have in this country, he said, four times as many motor vehicles as there are in the rest of the world. But there is need for greater coordination in the development of our state and local road systems, Professor Petty stated, and greater understanding of the problems of each. Each type of road plays an important part, but we need a perspective on the value of each.

More money must be provided for highways, he stated. At present, each motorist pays \$57 a year for highways; he pays twice that much for insurance. Highway departments must be managed as well as private business is. Then we can go to the people with the highway story, backed up by facts and figures, to secure the necessary financing of our needed highway program.

Varied Subjects Covered

The theme of the morning session of the second day was uses of the roadsides. Emmett H. Karrer, Associate Professor of Highway Engineering, Ohio State University, presided.

The latest developments in drainage for application to roadsides were discussed by Carl F. Izzard, Highway Research Engineer, Public Roads Administration. Mr. Izzard urged greater application of hydrology and hydraulics to roadside work, and stressed the importance of considering ground cover and land use in handling run-off. Some of the good agriculture practices developed by the Soil Conservation Service could help cut highway-maintenance and erosion-control costs, he stated. "Get some engineering economics into highway design," Mr. Izzard said, and he urged a study of what nature is doing in drainage areas which are remaining unchanged.

Methods of construction and maintenance of park walks, drives, and turnouts were described by A. H. Hinkle, District Engineer of The Asphalt Institute. These generally follow the principles of highway construction. Local performance records should be checked before selecting materials and type of paving, he said.

Other subjects covered in this session were parking and access problems on rural roads, discussed by Harold G. Bauerle, Traffic Design Engineer, Michigan State Highway Department; and zoning as it affects a state, county, and township and their highways, by George Wallace, Executive Director, Montgomery County Planning Commission, Dayton, Ohio.

Wilbur H. Simonson, Chief, Roadside Section, Public Roads Administration, presided at the final session. Horticultural and maintenance aspects of roadsides were covered.

The use of chemicals in weed control was discussed by Assistant Professor E. K. Alban, Department of Horticulture, Ohio State University. He touched on the use of 2,4-D, 2,4,5-D, and the newer Chemical TCA. He urged that specifications for weed-control chemicals be put on a biological and physical rather than a chemical basis. Because of the drift problem and danger of crop damage in spray treatment, care should be taken in the use of these chemicals, he pointed out, and the user should be familiar with their properties.

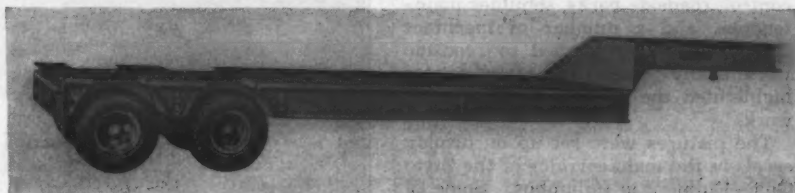
Edward H. Scanlon, Commissioner, Division of Shade Trees, Department of Public Properties, Cleveland, Ohio, discussed the selection and care of trees for streets and highways. And George G. Holley, Landscape Architect, Public Roads Administration, spoke on the problem of trees in the assessment of highway land damage.

Pictorial Exhibit

A new feature of the meeting was a picture exhibit of roadside work across the country. The pictures showed methods of slope stabilization, erosion (Concluded on next page)

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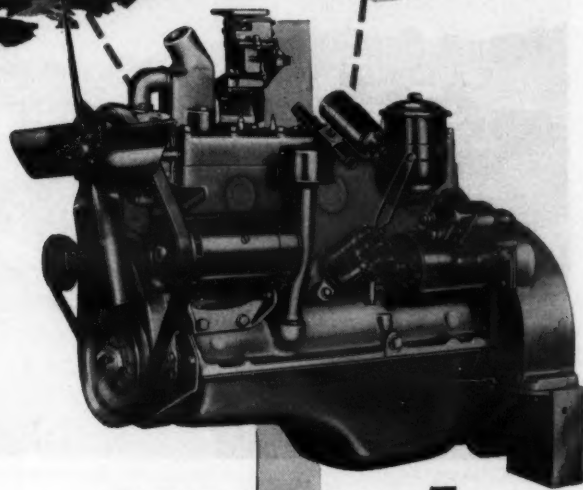
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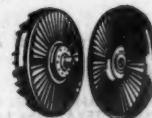
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Eighth Short Course On Roadside Problems

(Continued from preceding page)

control, roadside parks, shoulder maintenance, and a number of machines developed for or adapted to roadside work. Many "before and after" photos highlighted the results of this type of work.

The pictures were set up on display easels in the main corridor of the State Office Building in Columbus. Some 20 states submitted them, as well as Puerto Rico, the Canal Zone, the Virgin Islands, Hawaii, Alaska, and Canada.

Inspection Trip

As a part of the short course, a two-day inspection trip to the southeastern part of Ohio was provided. Two busloads of those attending the meeting took advantage of this opportunity to see some of Ohio's roadside parks and slope-stabilization work, as well as other points of interest in that section of the state.

Truck-Mounted Crane Has 5-Ton Capacity

A new-model convertible excavator is announced by the Schield Bantam Co., Inc., Waverly, Iowa. It is designed to mount on truck chassis of 1½ tons or larger, and is also available on half tracks. The machine has a capacity of 60 yards per hour when used as a shovel or dragline, a capacity of 5 tons when used as a crane, and a capacity of 100 feet of 5-foot ditch per hour when used as a trench hoe. It can also be used as a pile driver.



This is the M-49 Bantam, a new and improved model with a capacity of 60 yards an hour as a shovel or dragline, 5 tons as a crane, and 100 feet of 5-foot trench an hour as a trench hoe. It can also be used as a pile driver.

The Model M-49 has an independent spur-gear-drive boom hoist which permits the boom to be powered up or down, or lowered on the brake for fast operation. The jack, drum, and swing shafts are mounted on Timken tapered roller bearings. The drums, swing gears, and vertical swing shaft roll on pre-lubricated sealed-for-life ball bearings. The sealed-in triple-roller chain drive runs in an oil bath. All gears and pinions are machine-cut. Parts subject to extreme wear are flame-hardened.

Internal expanding mechanical clutches are used on both swing and drum shafts. The improved hook-roller design incorporates three larger ad-

justable cam-type hook rollers. The redesigned turntable rollers have larger axles and bushings. The machine-cut bull gear is bolted in place and may be rotated if necessary to distribute wear.

Additional features include a new cab design for improved visibility and greater convenience in servicing; simplified controls; and a new heavy-duty

14-foot trench-hoe boom with cast-steel head which permits a larger and stronger axle and bushings to compensate for twisting strain.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 72.

Drills for Earth Testing

Testing drills, and their operation, are described in an 8-page bulletin issued by the New York Engineering Co., 75 West St., New York 17, N. Y. The catalog features a 2-page spread showing the principal parts of the Empire hydraulic testing drill, and also a typical assembly for hydraulic jet drilling. These parts include casing sections, cutting shoe, perforated jetting bit, driving cap, drill handle, drill coupling wrench, drill rod, drilling bit, drill pump, auger drill spoon, clay auger, fulcrum fork, overflow tee, pipe handle with hose attachment, pulling cap, pump jar, and others.

The bulletin also illustrates and explains the operation of the Empire drills. It tells how to start the hole, what the various parts do as the hole is drilled, what procedures to follow when various types of obstructions are hit, and how to care for and repair tools.

This literature may be obtained from the company, or by using the Request Card at page 16. Circle No. 51.

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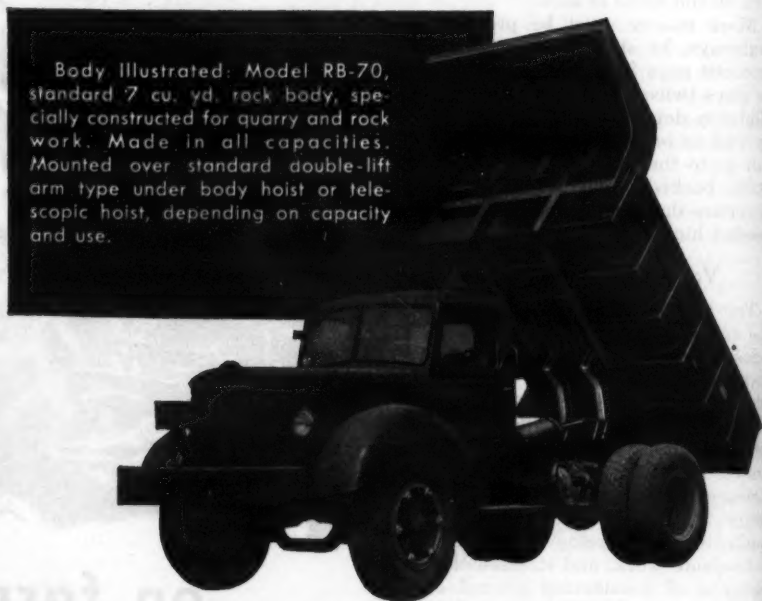
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Body Illustrated: Model RB-70, standard 7 cu. yd. rock body, specially constructed for quarry and rock work. Made in all capacities. Mounted over standard double-lift arm type under body hoist or telescopic hoist, depending on capacity and use.

Keep ahead of schedule with "On The Job" Design

In Marion Bodies and Hoists you get dependable loading, hauling and dumping performance that keeps you "loads ahead." With "On The Job" design you get sturdy construction features developed by Marion engineers in the field under actual operating conditions.

Ask your Marion Distributor about the Marion unit designed "on the job" to meet your special requirements, or write direct.

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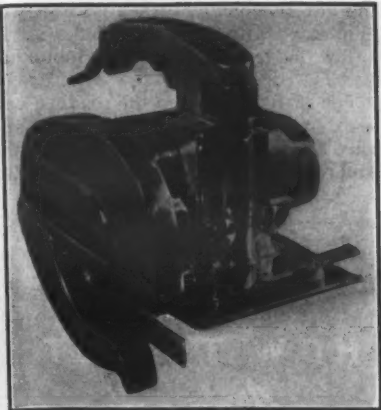
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Is Information Headquarters

for contractors, highway officials and distributors wanting further details or printed matter from the manufacturers advertising in these pages. Our Reader Service Department will be glad to forward any literature or special requests you mail to us at the above address.

CONTRACTORS AND ENGINEERS MONTHLY



Porter-Cable's new 6-inch all-purpose saw is designated the Guild A-6.

New 6-Inch Power Saw

A new lightweight electric rotary hand saw is announced by the Porter-Cable Machine Co., 1714 N. Salina St., Syracuse 8, N. Y. The Guild A-6 saw has a 6 1/4-inch-diameter blade with a 1/2-inch standard round hole. The depth adjustment can be regulated for any depth from 1/2 inch to 2 inches. The saw is designed for one hand operation and has a trigger switch on the handle.

A turbine fan draws air through the motor and discharges it at the front, blowing the dust off the line of work. The saw-blade housing has a separate rear discharge outlet designed to prevent dust from working back into the motor. The Guild A-6 has hardened-steel helical gears similar to the larger Speedmatic saws.

A safety guard exposes the saw blade only where it cuts into the wood. The A-6 is constructed to permit the use of cross-cut and rip guides. It has a 115-volt ac/dc motor; an idle speed of 5,500 rpm; and a load speed of 3,200 rpm. It is 10 inches long, 8 1/2 inches wide, and 9 1/2 inches high.

Further information may be secured from the company, or by using the Request Card at page 16. Circle No. 104.

Oil-Inspection Kit

Equipment for testing the condition of lubricating oils is available from The Gerin Corp., P. O. Box 653, Red Bank, N. J. It can be used for determining four types of contamination: amount of asphalt and other gummy deposit-forming materials; change in viscosity due to fuel dilution and other causes; amount of dirt, metal particles, other sediment, and water; and whether acidity has become excessive.

With the Gerin equipment, as many as eight tests can be run in a 40-minute period, the manufacturer states. It consists of an electric-motor power unit, a rack for storing tubes, a centrifuge, an aluminum case, etc. The Gerin oil-inspection kit contains enough equipment and supplies to run 72 tests; complete instructions are provided with it.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 108.



HOISTS DERRICKS WINCHES

A Complete Line of Builders' Derricks and Winches—nationally known for dependable service and long life.

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The Sagen line is handled by leading equipment distributors everywhere.

SASGEN DERRICK COMPANY
3101-27 W. Grand Avenue, Chicago 22, Ill.

Triangular Scale Has a Three-Finned Shape

A triangular scale featuring a 3-finned construction is announced by Wolsey Co., Inc., 727 Kohler St., Los Angeles 21, Calif. Its three white Vinylite scales are mounted on an aluminum core designed to provide a positive grip all along its length. The Tri-Fin scale is available with either engineer's or architect's markings.

Markings are black on white for easy reading and scale edges are chip-proof. The combination Vinylite and aluminum construction prevents shrinkage, the manufacturer points out.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 126.

Data on Bucket Loaders

Bucket loaders in two models are described in a catalog available from N. P. Nelson Iron Works, Inc., 820 Bloomfield Ave., Clifton, N. J. The

Model K-5 is designed to load up to 2 yards a minute. It has a straight boom and a 180-degree-swivel spout discharge. The Model K-5B is built on the same chassis as the K-5, but it is equipped with a pivoted conveyor discharge.

The folder contains a brief description of several features claimed for these bucket loaders, including economy of operation, gravity or conveyor

discharge, and one-man operation. It points out that they will handle many types of materials, and that they bite into the load or stockpile of material before they shovel. Specifications cover the 27-hp gasoline-engine power unit, the transmission, chassis, boom, wheels, elevator, feeder, speeds, etc.

This literature may be obtained from the company. Or use the Request Card at page 16. Circle No. 118.

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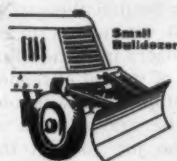
POWER HYDRAULIC CONTROL

Lifts equipment ten times faster than hand pump. Easy installation on new or existing equipment. Hundreds of applications, such as Snow Plows, Sweepers, Power Mowers, etc. Priced for the most conservative budget.

WRITE FOR CIRCULAR H-75

"QUALITY MACHINERY SINCE 1856"

MONARCH ROAD MACHINERY COMPANY, 327-329 Front Ave., N. W., Grand Rapids 4, Michigan



THE NEW Heavy Duty MOTO-PAVER



The Moto-Paver is a very flexible as well as a mobile unit. The illustration shows it being used as a stationary mixing plant.

Although developed primarily to meet the rugged conditions of hilly and mountainous terrain, the heavy duty Moto-Paver is proving equally efficient under widely differing conditions in other sections of the country.

Wherever you have a heavy bituminous mixing, retread or stabilization job, it will pay you to investigate this new and more powerful Moto-Paver. It does the *complete mixing and laying job—in one continuous operation*. See your local distributor listed below, or write direct for specifications and complete information on either the heavy duty or standard Moto-Paver.

HETHERINGTON & BERNER INC., 731 KENTUCKY AVE., INDIANAPOLIS 7, IND.



**H & B Builds Portable and Stationary
Asphalt Plants of All Types, Sizes and Capacities**

Hot Plant-Mix Laid On Treated Gravel

Reconstruction of Road Includes Straightening Curves, a Better Base, And Drainage System

† LAST year the New Hampshire State Highway Department reconstructed a 3.3-mile section of State Route 13 between Milford and Brookline in Hillsboro County, in the south central part of the state. Pavement on the new stretch of highway consists of two courses of plant-mix bituminous concrete laid to a 24-foot width on a gravel foundation course that had been surface-treated with tar.

The Highway Department awarded a contract for the project to Landers & Griffin, Inc., of Portsmouth, N. H., on a low bid of \$250,737. The black-top work, in turn, was performed by O. F. Winslow, Inc., of Milford, N. H. The job got under way the middle of April, 1948, and was completed last November.

Grading and Drainage

A section of State Route 13 was rebuilt in 1947 from the Massachusetts state line, through Brookline, N. H., to the south end of the present contract. The 2 miles of highway from the north end of the recent contract into Milford will be reconstructed at a later date.

The original highway had only a bituminous surface-treated gravel pavement with a maximum width of 20 feet. At the lower end of the job some curves were straightened out, but for the upper 2 miles the alignment of the old road was closely followed. A new drainage system was installed over practically the whole contract.

For the 54,700 cubic yards of earth excavation, the contractor used a Link-Belt 1¾-yard and a Northwest 1½-yard shovel which loaded the material to a fleet of twelve 6-yard trucks. A couple of International TD-18 tractor-dozers also worked on the grading, digging in the cuts and spreading material on the fills.

As the roadbed took shape, work proceeded on the gravel base course which was laid the full width of the roadway or 34 feet—24 feet for the pavement and

10 feet for the two 5-foot shoulders. On the bottom this gravel base was even wider, averaging 46 feet. On fills the gravel is 1 foot thick, and it is from 18 to 30 inches deep in the cuts. Whenever unsuitable clay material was encountered in the cuts, it was removed and replaced with gravel to assure good drainage to the highway.

The gravel came from a borrow pit located near the south end of the job, where it was excavated by either of the two shovels. Trucks hauled the gravel to the road, where it was end-dumped and spread by the dozers in 9-inch lifts wherever the depth of gravel exceeded one foot. Good compaction was obtained by starting the gravel work at the south end of the job so that the

trucks continually hauled over the new base. Traffic was permitted as usual during these operations—this also helped the compaction. In addition the lifts were rolled by a 12-ton 3-wheel roller. Final shaping of the roadbed was performed by an Adams motor grader.

Some of the old drainage pipe still in good condition was removed and relaid. This amounted to 420 linear feet of 12 to 30-inch pipe. The new culvert pipe installed totaled 3,650 linear feet of 12 to 36-inch reinforced-concrete lines. The larger trenches were dug by a ¾-yard backhoe.

Tar Treatment

The gravel in the roadbed was well graded from 3 inches down, so that the new pavement would have a 3-inch crown at the center. The 5-foot shoulders slope at the rate of ½ inch to the foot. In fills up to 7 feet in height the side slopes are 4 to 1; above that height all fill slopes are 1½ to 1, the same as

the cut sections. Much guardrail was eliminated with the flat 4 to 1 slopes. In a few ledge cuts the side slopes are 1 to 2.

The 26-foot center of the roadbed was then surface-treated with T-5 tar applied at the rate of 0.5 gallon to the square yard. This treatment extended

(Continued on next page)



PROVED PERFORMERS ON THE TRENCHING JOBS

CLEVELANDS CAN BE DEPEND ON FOR

- FAST ACCURATE DIGGING
- MINIMUM "DOWN TIME"
- PROMPT PARTS SERVICE
- LOW OPERATING COSTS

... whether the work's for water, sewer, power, gas, telephone, oil or gasoline lines, for drainage, irrigation or building foundations. Fast, mobile, rugged, easy operating, amply powered, compact and with all excess weight eliminated—CLEVELANDS enable you to meet easily the many varying conditions of country, town or city work. For the CLEVELAND model best fitted for your work, call your nearest CLEVELAND distributor, or write direct.



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HOW TO GET Larger BUCKET PAYLOADS



This new Erie Catalog makes it possible to quickly choose, from the 4 classes of Erie 2-Line Buckets, the right bucket for your crane and material. Perhaps your crane can operate a larger bucket, for Erie alloy welded steel buckets result in greater payloads through scientific bucket weight reduction. Remember, that on bucket work, the cost of the crane and the operator all ride on the bucket. Send for this helpful catalog or outline your conditions and our engineers will make recommendations.

Write for Catalog 2L-1

Today





C. & E. M. Photos
Above, a Sterling truck dumps 10 tons of hot plant-mix into a Barber-Greene Finisher on New Hampshire State Route 13. The material is compacted by the Buffalo-Springfield 17-ton 3-axis tandem roller shown at right.



one foot beyond the pavement on each side to support the edges of the black-top and prevent raveling. The bitumen was applied by H. H. McGuire & Co., Inc. of Malden, Mass., with a Kinney 2,500-gallon distributor mounted on a Mack truck. It was shot in two 13-foot lanes at a temperature of 140 degrees F. The tar was obtained at the Fitchburg, Mass., plant of the American Tar Co., and hauled 18 miles to the job in the distributor.

As the tar was applied, it was covered with a layer of sand about $\frac{1}{8}$ inch thick, put on from a Burch spreader box hung to the tail-gates of the supplying trucks; the cover sand was procured from the gravel pit after the material was screened through a $\frac{1}{2}$ -inch sieve. This surface treatment was then repeated, with a second application of T-5 tar at the rate of 0.25 gallon to the square yard which was covered with a slightly lighter coat of sand. This was done to seal completely any porous areas that might have been left even after the first surface treatment.

Plant-Mix Pavement

Plant-mix for the pavement was laid in two lifts—a 2-inch base or binder course followed by a 1-inch surface or wearing course. The bituminous concrete was mixed in the permanently set up asphalt plant of O. F. Winslow, Inc., just west of Milford on State Route 101. This commercial plant serving the southern section of New Hampshire is a Cummer with a 1-ton pugmill. Esso asphalt with a penetration of 85 to 100 was used in the mix, after being hauled in 2,500-gallon trailer trucks from Boston. Sand and gravel aggregate was obtained from a pit adjoining the plant

where a crusher was set up.

The mix was hauled an average of 5 miles from the plant to the job in six
(Concluded on next page)



How far between your engine overhauls?

Engine overhauls are few and far between for the Consumer Sales Agency fleet, Moline, Illinois. Its International K-11 trucks travel from 100,000 to 130,000 miles before any mechanical service work, requiring removal of engine heads or dropping of pans, is needed.

Operators of this fleet credit the plus qualities of Stanolube HD Motor Oil for the fine performance of their heavy-duty trucks. They report that engine parts have lasted longer because they have been kept clean and protected against wear.

Stanolube HD delivers the lubrication performance that will keep your fleet units rolling longer between overhauls. This heavy-duty lubricant owes its superiority to the combination of effective oxidation-resistant and detergent additives with solvent-extracted base stocks of the highest quality. Extra protection that cannot be

obtained from straight mineral oils is thus afforded by Stanolube HD.

Consider the experience of the Consumer Sales Agency fleet with Stanolube HD. Why not let the unusual performance of these trucks point the way to lower maintenance costs for your fleet? Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Ill.

Stanolube HD Motor Oil

STANDARD OIL COMPANY (INDIANA)



FRONT END LOADERS

for Industrial Tractors

Extensible Booms—8' lift
 $\frac{1}{2}$ and $\frac{3}{4}$ cu. yd. capacity

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CONCRETE VIBRATORS

Gasoline Engine and
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for Stone and Sand

ASPHALT PLANTS

Portable—Stationary

Write for Circulars

White Mfg. Co.

ELKHART

INDIANA

Hot Plant-Mix Laid On Treated Gravel

(Continued from preceding page)

Sterling trucks holding from 7 to 10 tons, and was laid by a Barber Greene Finisher at a temperature of 250 degrees F. The finisher was adjusted for 12-foot lanes, and the usual procedure was to do a morning's work on one 12-foot half of the pavement, and then move the machine back and complete the other half in the afternoon. In this way, with the mix still warm, a tight joint was obtained along the center line, and every night the work was squared away with the two lanes even. When about a mile of binder course had been laid, the mix was changed and the surface was then laid to complete that section of pavement.

Compaction was obtained with a Buffalo-Springfield 17-ton 3-axle tandem roller. Traffic was maintained over State Route 13 during the work on the binder course, but when the surface course was being laid the highway was closed. A paralleling detour was available, however, only 3 miles longer than the state road. In a 9-hour day an average of 400 tons of plant-mix was laid. For the full 24-foot width of pavement, 30 tons of mix was required for 100 linear feet of binder course, and 15 tons for the same length of surface. No seal was put on the top course.

A six-man crew was adequate to look after the paving operations. This working force included a foreman, finishing-machine operator, raker, roller operator, and two laborers. The laborers did whatever shoveling was necessary, and also handled the flagging when traffic was being maintained.

Job Mix

The weights of the job mix for the binder and surface courses as produced in the 1-ton pugmill were as follows:

Contents	Binder Course	Surface Course
1-inch aggregate	900	935
3/4-inch aggregate	380	935
1/2-inch aggregate	630	130
Asphalt	90	
Total	2,000	2,000

The gradation of the aggregate used in both courses was as follows:

Sieve Size	Binder Course	Surface Course
1-inch	100	100
3/4-inch	90-95	100
1/2-inch	25-40	35-75
No. 4	18-38	30-50
No. 10	15-35	24-45
No. 20	8-25	10-40
No. 40		5-19
No. 80		2-5
No. 200		

Quantities and Personnel

The major items of the 3.3-mile highway contract included the following:

Earth excavation	54,700 cu. yds.
ledge excavation	3,900 cu. yds.
Gravel-borrow base course	30,000 cu. yds.
Bituminous surface treatment	40,000 gals.
Plant-mix pavement	8,000 tons
Reinforced-concrete pipe, 12 to 36-inch	3,650 lin. ft.

Contractor personnel included George Landers of Landers & Griffin, Inc., who served as Superintendent for the contractor, and Andrew C. Elliott, Jr., of O. F. Winslow, Inc., who acted as Superintendent on the black-top paving operations. H. H. McGuire is President of the latter concern.

For the New Hampshire State Highway Department, J. E. Christiansen was Resident Engineer, and Edward Christenson was Inspector at the asphalt plant. The Highway Department is headed by Frederic E. Everett, Commissioner, with D. H. Dickinson as Chief Engineer, and Robert H. Whitaker, Construction Engineer.



C. & E. M. Photo

The President and Black-Top Superintendent of O. F. Winslow, Inc., survey their plant-mix job on New Hampshire State Route 13—respectively, H. H. McGuire, left, and Andrew C. Elliott, Jr., right.

STANDARD STEEL "S-J"

FOR HIGH SPEED MAINTENANCE—PATCHWORK
OR SECONDARY CONSTRUCTION



This \$1500 "S-J" will
give Years of Service
and Handle Every
Maintenance Job with
No Time Lost

THE STANDARD STEEL "S-J" CAN BE HAD TRUCK MOUNTED OR DUAL WHEEL TRAILER MOUNTED

Users from coast to coast find the Standard Steel "S-J" is like a "highway patrol car". Easy to move for emergency patching—economical to operate on all maintenance jobs. The entire cost of an "S-J" can be paid for many times over in a single-season with years of operating value in it. Think of the profit you can make on every type job from patching to building drives, playgrounds, sealing streets, airports, etc. Here is the equipment to use for fast action at low cost in all maintenance and secondary construction work.

WRITE FOR CATALOG "S-J"

OTHER PRODUCTS

Asphalt Pressure Distributors,
Tar Kettles, Patch Rollers, Supply
Tanks, Tool Heaters, Asphalt
Tools, Street Flushers, Construc-
tion Brooms.



Standard Steel Works NORTH KANSAS CITY, MO.



Buffalo-Springfield's Model KX-25—Twin Disc equipped

Twin Disc Keeps Them Rolling

In February, 1929, The Buffalo-Springfield Roller Company introduced Model VT-21, a seven-ton tandem road roller. This roller was equipped with Twin Disc Clutches.

In February, 1949, Buffalo-Springfield is building Model KX-25, a 12-18 ton, three-axle tandem roller. This roller also is equipped with Twin Disc Clutches.

For more than 30 years, leading manufacturers of equipment for every industry have found Twin Disc Clutches and Hydraulic Drives the answer to power transmission problems. TWIN DISC CLUTCH COMPANY, Racine, Wisconsin (Hydraulic Division, Rockford, Illinois).



SPECIALISTS IN INDUSTRIAL CLUTCHES SINCE 1918



This P&H Model 255-A truck crane, with a 135-foot boom and 20-foot jib, is placing steel on a 148-foot tower at Plymouth, Michigan.

Crane Places Steel Using 155-Foot Boom

A truck crane in operation with a 155-foot boom-and-jib combination is described by the Harnischfeger Corp. The P&H Model 255-A used a 135-foot boom and a 20-foot jib to place steel on a 148-foot tower being erected at St. John's Provincial Seminary at Plymouth, Mich. Taylor & Gaskin handled the steel contract.

After the boom was raised to a 45-degree angle by another crane, the P&H completed elevation. Erection Superintendent R. Anderson reports that outriggers weren't necessary and that the machine was stable even in making 360-degree swings with 2-ton loads, operating at about a 15-degree radius.

Retainer Star Drills

Retainer-type star drills for use with the Handi-Drill are now available from the Cleco Division of the Reed Roller Bit Co., P.O. Box 2119, Houston, Texas. Designed to fit directly into the drill to give a direct drive on the steel, the new line of star drills now enables the Handi-Drill to drill holes up to 1½ inches in diameter.

The Cleco Handi-Drill weighs 9 pounds and is designed for one-hand operation. It operates at a speed of from 1,800 to 2,000 strokes per minute; is 13 inches long without retainer; and is designed to hit and rotate the drill at the same time.

Further information may be secured from the company, or by using the Request Card at page 16. Circle No. 109.

U. S. Rubber Promotions

Three staff promotions are announced by the United States Rubber Co., New York City. Walter F. Spoerl is named General Sales Manager of four divisions, including the Mechanical Goods Division. Robert D. Gartrell is named Development Manager of the same four divisions. And Wesley A. Armstrong is named Production Manager.

Eaton Axles Made in Canada

Eaton 2-speed truck axles are now made in St. Catharines, Ontario, through a special arrangement between the Eaton Mfg. Co. and The McKinnon Industries, Ltd. This axle uses planetary



Jobs Done Quicker, Cheaper

Attached to Tractors, Bulldozers, Motor Graders and Scrapers, the Automatic Slope-Meters are in use on the construction of highways, airports, dams and building sites. Slope-Meters are compact, sturdily constructed instruments that will automatically show the operator the exact grade or slope on which he is working.

Order from Your Equipment Distributor Today
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WM. H. ZIEGLER CO., INC.
2929 University Ave. S. E., Minneapolis 14, Minn.

gearing to provide a high-speed range and a low-speed range in the same unit. A vacuum-powered control unit permits axle shifting by finger-tip movement, the manufacturer states.

Post-Hole Diggers For Truck Mounting

Truck-mounted post-hole diggers are available from Tel-E-Lect Products, Inc., 9601 Minnetonka Blvd., Minneapolis 16, Minn. The Tel-E-Lect digger will operate on any truck equipped with a derrick and winch, the manufacturer states. It is driven by a power take-off shaft extending from the truck transmission to the extreme rear of the truck frame.

The Tel-E-Lect post-hole digger will dig holes from 9 to 16 inches in diameter and 8 feet in depth. It can be used to drill perpendicular holes regardless of truck position, or it can be used to drill holes at an angle from the perpendicular. Features include all-



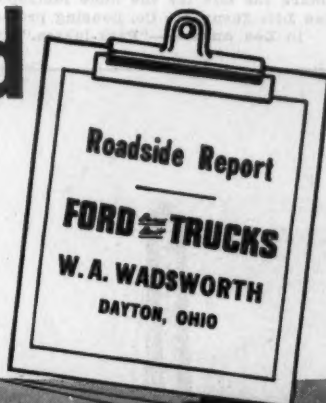
The Tel-E-Lect post-hole digger operates on any truck equipped with a derrick and winch. It will dig holes 9 to 16 inches in diameter and 8 feet deep.

steel construction, safety shear bolt, hand guide, replaceable steel cutting edges, heavy-duty universal joints, torque-control housing, telescoping

hex-drive shaft, and others.

Further information may be secured from the company, or by using the Request Card at page 16. Circle No. 106.

"Our FORD F-8 pulled a 25-ton shovel up 4th St. Hill!"



"RECENTLY we had occasion to place our 25-ton shovel at the top of East 4th Street Hill in Dayton," reports W. A. Wadsworth, General Manager of Southern Hills Pit, Inc. "We did this with our Ford F-8 Big Job without the assistance of a second truck and had a comfortable reserve of power. To our knowledge, no other make of truck has pulled the hill our F-8 did, with a similar load."

Owners and drivers sing the praises of the new Ford Big Jobs. Owners like Big Job extra power and low cost operation. They claim the new 145-horsepower engine outsaves engines much smaller in size. Drivers are enthusiastic about the ease and comfort of the Million Dollar Cab and its Ford Level Action suspension. Both are impressed by Ford Bonus Built construction, characteristic of 139-plus models in a full truck line. Bonus Built is the superstrong construction that contributes to long truck life.



BUILT STRONGER TO LAST LONGER

USING REGISTRATION DATA ON 5,444,000 TRUCKS,
LIFE INSURANCE EXPERTS PROVE FORD TRUCKS LAST LONGER!

ONLY THE FORD BIG JOB HAS ALL THESE FEATURES!

- ★ New 145-h.p. Ford V-8 engine for top performance.
- ★ Ford exclusive concentric dual-throat carburetor for more power, more economy.
- ★ New heavy duty 5-speed transmissions for operating flexibility.
- ★ Big Ford power-operated brakes for sure-footed stopping; rear 16-inch by 5-inch on the F-8.
- ★ Ford Super Quadrax 2-speed axle with vacuum shift for performance flexibility in Model F-8 (single speed axle also available); single-speed Quadrax Hypoid Axle in Model F-7.
- ★ Large diameter (10-inch) wheel bolt circle with 8 studs to allow for extra-strong hub construction.
- ★ Million Dollar Cab with Ford Level Action suspension for greater driving comfort.
- ★ Nationwide service from over 6,400 Ford Dealers.
- ★ Ford Bonus Built construction for long truck life.

Gross Vehicle Weight Ratings: F-8 up to 21,500 lbs., F-7 up to 19,000 lbs. Gross combination ratings: F-8 up to 39,000 lbs., F-7 up to 35,000 lbs.



Raymond Concrete Pile Co. Photo
Only birds and airmen can take in at a glance the site for the huge Metropolitan Life Insurance Co. housing project in Los Angeles—"Parklabrea."

Big Pile-Driving Job On Housing Project

10,854 Step-Taper Piles Driven Beneath Huge New Height-Limit Apartments In Los Angeles

By RAYMOND P. DAY,
Western Editor

Photo on page 1

✦ CONSTRUCTION of 18 new height-limit apartment buildings 13 stories high in the heart of Los Angeles' famous Wilshire District has posed one of the big pile-driving jobs of the Pacific coast. According to O. C. Struthers, West Coast District Manager for the Raymond Concrete Pile Co., the project is the largest installation of its kind ever built on the west coast. Exactly 10,854 Raymond step-taper cast-in-place concrete piles are being driven.

The job is the huge new \$40,000,000 addition to the Parklabrea Housing

Project, now under construction for the Metropolitan Life Insurance Co. of New York. Starrett Brothers & Eken, Inc., of New York is prime contractor for the new job, which includes in addition to the 18 new modern apartment buildings a series of two-story structures to match those in the west 85 acres of the tract of choice property where other buildings were previously built during the war.

The new project is a Metropolitan Life Insurance investment in better living for more people. In each of the 18 new height-limit apartment buildings there will be 153 new apartments, all designed with an outside exposure. These 2,754 new apartments in the 13-story buildings, with an average of three people per apartment, will take care of some 8,262 persons. Thus the new development will compare with Metropolitan's Peter Cooper Village in New York City.

Design of New Buildings

Los Angeles is a city where people take \$40,000,000 projects in stride, but the mere fact that this job is only an addition to Parklabrea made a feature story of some significance in its booster-minded newspapers. Designed by Leonard, Shultze & Associates, New York architects, the apartments are going to be a radical advancement in the comfort of occupants. Gordon B. Kaufmann and J. E. Stanton are associate architects, and Bowen, Rule & Bowen, structural engineers—both of Los Angeles.

Congestion of furniture and personal property on the first floor, due to occupants moving in or out, will be eliminated by two elevators which will go down to the basement. Each building will have its own central heating plant. The individual apartments are of various sizes, with one or more baths. They will have refrigerators and gas ranges. Floor plans are unusually compact and convenient.

Garages, gardens, and playgrounds will be available, and ample space has been provided between the buildings. The new addition is adjacent to the famous Miracle Mile of Wilshire Boulevard, near one of the finest shopping centers in the country. Rental applications are already being received, although the pile driving and foundations are not yet finished.

The buildings are to be built of reinforced concrete. They will rest on 86 reinforced-concrete footings, under which the clusters of piles are now being driven. The use of field-welded reinforcing steel in upright columns achieves new economy in the use of that critical material.

When the big job is finished some time late in 1950, Metropolitan Life Insurance Co. will have improved a 176-acre plot between 3rd and 6th Streets near La Brea Avenue.

Construction of the 13-story buildings called for the demolition of foundation work started in that area before the war. Foundations were for 2-story apartment buildings, but these foundations were removed and the plans changed to provide the newer, higher apartment buildings.

(Continued on next page)



C. & E. M. Photos

Raymond Concrete Pile Co. is driving 10,854 step-taper cast-in-place concrete foundation piles for the 18 apartment buildings. At left is a ground-level view of one of the company's four rigs in action, and, at right, the corrugated-metal pile shells are made up in advance of driving. They are 10 1/4 inches in diameter at the driving end, and increase an inch in diameter every 8 feet.



C. & E. M. Photo

Charlie Guth's pile driver has the shortest leads on the job—64 feet instead of 80 or 72. "But I'm doing OK," says Guth (right) to General Superintendent Carl Johnson.



C. & E. M. Photo

Here, with the pile shell driven, a Willard truck-mixer, Ford-mounted for portability, discharges a batch of concrete into the shell almost under the tail of the pile driver.



C. & E. M. Photos
A truck-mixer delivers a batch of concrete to a foundation pour at the Parklabrea Housing Project (above), then zips back to the main batch plant, a Conveyco manual model, for another batch (right).



Excavation Starts Job

About 17,000 cubic yards of surplus earth and structural excavation had to be removed to make room for pile-driving and concrete-foundation work. This was done by Spicer Co. of Los Angeles, which subbed the work from Starrett Brothers & Eken. A Northwest 1½-yard dragline dug the material out, and loaded it to dump trucks which hauled it out to low spots and other disposal areas.

The bottom of structural foundation excavation was generally reached without trouble from ground water, though ground water was very close to this point. Additional excavation for elevator shafts did reach down into ground water, and these excavations had to be protected with timber sheeting and pumps. Fortunately the sewer system was already in, and unwatering pumps dumped their output directly to it.

Pile-Driving Job

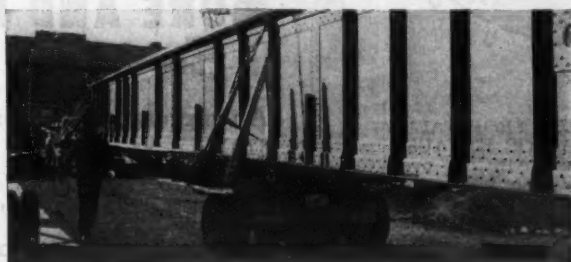
The job of driving the concrete pile foundations under the buildings was unusually interesting, because one of the prime factors to be considered was that of speed. In order that pile driving could be done speedily, with a minimum of delay to subsequent parts of the job, a production rate of at least 100 piles completed per day was desirable. On this basis, a subcontract for pile driving and concrete cast-in-place work was let to the Raymond Concrete Pile Co. of New York, using men, equipment, and supervision from Raymond's Los Angeles district office.

Raymond step-taper cast-in-place concrete piles were selected for the job. This pile consists of a tapered 14 to 16-gage metal shell 10½ inches in diameter at the driving end, increasing an inch in diameter every 8 feet. The 8-foot metal shell sections are corrugated to develop the maximum amount of skin friction in place in the ground. This metal shell, after being driven to depth, is then filled with concrete. Plain concrete without reinforcement, designed for a strength of 3,000 pounds at 28 days, is being used on the Parklabrea job piles. The average diameter of piles at the top was 15 inches. Length varied from 30 to 45 feet, and all were driven to a minimum bearing of 35 tons.

Survey stakes were placed in the exact position of each pile to mark the exact location, and the piles were driven (Continued on next page)



Completed roadway, looking south. Local waterfront traffic and docks visible at right.



Huge 44-ton girder, fabricated by Bethlehem, is slowly wheeled into place. Bethlehem fabricated and erected 2552 tons of structural steel for the West Side Highway extension.



Street-level view, showing steelwork completed. Local traffic was maintained while overhead construction was in progress.



Tying Bethlehem Reinforcing Bars, prior to pouring concrete. Bethlehem Reinforcing Bars used in this project totaled 350 tons.



Henry Levinson (center), Section Engineer, Office of President, Borough of Manhattan, with Eric Nelson (left), General Superintendent, and A. J. Linsky, President, Lynn Construction Co.

In order to provide a direct, high-speed approach to the new Brooklyn-Battery Tunnel, the Borough of Manhattan of the City of New York recently extended the lower end of its heavily-traveled West Side Elevated Highway. These scenes were taken on a 1217-ft stretch of the new four-lane road, between Duane and Barclay Sts. Contractor: Lynn Construction Co., Inc., New York. Structural steel fabricated and erected, and reinforcing bars supplied by Bethlehem.

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Big Pile-Driving Job On Housing Project

(Continued from preceding page)

to very close tolerance both as to location and plumb. The number of blows per foot at minimum bearing was worked out by L. T. Evans, Foundation Engineer, and controlled by inspectors in the field.

Raymond Concrete Pile Co. quickly moved in to the job with four of its standard pile-driving rigs, each machine equipped with a 45-hp boiler, a 3-drum steam hoist, a Raymond single-action steam hammer with a 6,500-pound ram and standard-size steam chest, and a set of stationary leads. One of the rigs had an 80-foot set of leads, two were equipped with 72's, and one had 64-foot leads. The advantage of higher leads, of course, consists of more headroom under the hammer, permitting longer piles to be made up and set directly under the hammer.

The Raymond standard rig weighs about 75 tons, and is mounted on a steel base about 18 feet square. Hardwood rollers, usually made of maple, permit the machine to roll forward or back on cribbing. Cribbing usually consists of 12 x 12 timbers leveled off so the pile-driver leads will be plumb and true. Two 12-inch steel H-beams, laid lengthwise under each side of the pile driver, give support to the rollers.

Forward and backward movement of the pile driver is controlled by lines anchored to deadmen several hundred feet away from the pile driver. Since the pile-driver deck is full-revolving on a turntable over the steel base, the machine can be spotted easily and quickly. Recently on the Parklabrea job one of the machines happened to be

spotted right to drive three piles without moving forward or backward. All three piles were located on the swing radius of the driver.

Raymond is using a 6,500-pound hammer ram in the hammers. This is somewhat heavier than ordinary, but it was necessary to drive the piles faster and meet the production deadline of 100 units a day. With a drop of 36 inches, the big hammers deliver almost 20,000 foot-pounds of energy per blow.

Hanging directly below the hammer base by a cable on each rig is a 6-ton steel mandrel, or core, which fits within the pile shell and does the driving. The base of this core bears evenly on the steel driving shoe at the base of the bottom section, and its shoulders also bear on the steps which taper the shells. This is a Raymond pile development designed to add to the penetration efficiency of the pile shell under heavy punishment. At Parklabrea, where extremely tough clays and adobe were found, the pile shells had to take a terrific hammering over much of the job, but it was very rare indeed that one of the shells was damaged. A 6-ton driving core was hammered so hard it crystallized and broke at one of the joints, but the Raymond tapered pile shell was undamaged.

To soften the stresses in the hammer base and the slide bar which controls the steam valves, eucalyptus wood blocks are inserted one at a time between the hammer ram and the top of the mandrel. One of these blocks usually lasts long enough to drive about three piles, but so much heat is generated by percussion that they soon catch fire and burn up.

Step by Step

Since the actual pile-driving methods

were precisely scheduled, let's follow one of the piles through the job. We'll visit Charlie Guth's rig, because it has the shortest leads, and Guth, a colorful and profane old-timer at the game, is always fighting a 5-pile handicap per shift compared to the other rigs, just on that account.

The steel shells were made in Youngstown, Ohio, and they are shipped by rail, with the sections telescoped within each other to save shipping space. They are trucked from the rail unloading point about 2 miles to the job, and unloaded at the building site close enough for the rig to reach them with its pile line.

Charlie has moved his rig down an incline to the foundation hole, and has his skids and cribbing laid out to carry the rig level during the driving. His crew dig holes for deadmen ahead and behind the rig so it can be moved along on the rollers.

Two men now take the steel pile shell sections and assemble four or five of them on a timber jig, built to cradle

them easily. There is some ground water here, so in order to make the shells waterproof they smear asphaltic joint compound over the section ends. The last section is marked with yellow crayon every 6 inches to help the inspector okay the piece for bearing when it penetrates that far. The pile shell is then rolled down over the bank near the pile driver.

A manila hoist line, reeved over a block near the top of the leads, now picks up the pile from one of the niggerheads. By the time it is raised, the hammer has stopped beating on the shell already driven, and the engineer is hoisting the big Raymond pile hammer and the 6-ton core far up to the top of the leads. As soon as the core clears the driven shell, men guide the new shell into the one just driven. It is then dropped to the bottom, making the top of the shell easily accessible to the ground crew.

Guth needs one more section, and because his leads are short he has to put

(Continued on next page)

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125	4 1/4"	3.00
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it on now. The extra piece is picked up, fitted to the top, and screwed on with power from a manila rope and the niggerhead man. The men are so dexterous at this that they have done it in the time it has taken you to read this paragraph.

To make up this last joint, the top section is already centered in the driving core, and the shell is now picked up until the driving core is snugged against it both at the stepped shoulders and at the steel driving point.

The rig is now quickly spotted over the next stake, with Guth using a radius stick from the revolving base of the machine. The operator then swings the leads around, Guth gives the signal to "drop 'er", and the hammer is already starting to beat before the pile shell stops penetrating from the weight of the hammer and mandrel.

Driving then continues until the required bearing factor is reached. Should another shell section be required, the mandrel has to be lifted out to get it on. Driving is somewhat less complicated on the rigs with leads high enough to handle the full section with headroom under the hammer, but they seldom get more than five or six piles more per shift due to the advantage. On the best day's run, 117 piles went down in 8 hours by the four rigs, and the general average was about 100 pieces, as planned.

Shells Filled With Concrete

The work of furnishing and placing the concrete within the pile shells is being done for Raymond Concrete Pile Co. by the Tomb Concrete Co. of Long Beach, Calif. This company, placing about 120 cubic yards a day, is staying up so well with the pile-driving rigs that frequently the concrete trucks are backed up almost against a pile driver.

Concrete-batching equipment consists of a 250-barrel bulk-cement hopper, a steel weigh bucket for cement, with Yale scales, a batch hopper for sand and aggregate, and a Le Roi-Westinghouse 50-kw generating plant. This plant furnishes lights around the place and power to the small Willard portable concrete batcher.

This small unit is a somewhat unique adaptation of the principle of portability in concrete production. It is mounted on rubber tires, and consists basically of an elevating bucket loader, several aggregate bins, and scales. It simply runs up to a pile of aggregate, loads a predetermined weight of the material, and then goes to the next pile to repeat the performance. When the machine is fully loaded, it is carrying the dry-batched sand and aggregates for a 2½-yard batch, which it then dumps to the hopper under the bulk cement.

The dry materials are then loaded with the mixing water to two Willard truck-mixers mounted on Fords. These machines mix the concrete, haul it out to the driven pile shells, and either dump the concrete directly in the shells or run it in with spouts. The concrete requires no vibration, since ordinarily the ground is vibrating anyway under the beating of heavy pile hammers near by.

The use of asphaltic joint material on the shell threads ordinarily prevents ground water from seeping in, but in case of a failure, a small 2-inch steam



C. & E. M. Photo

This Willard portable batcher is weighing out aggregates and sand for foundation-pile concrete on the Parklabea job in Los Angeles. Tomb Concrete Co. of Long Beach, Calif., is handling this work for the Raymond Concrete Pile Co.

siphon usually dries up the piles just before concrete is poured. The concrete is topped off at a grade mark established by surveyors.

Concrete Foundation Work

Concrete foundation work, including the building of forms, is now under way by Starrett Brothers & Eken. As fast as the pile drivers vacate a building, carpenters and concrete men swarm in.

All forms for the concrete foundations over the clusters of piling are being made of wood, usually 2 inches thick. Later on, when the walls and exposed surfaces are built, special glazed plywood will be used for facing to achieve a beautiful architectural effect, but the foundations will be backfilled, so there is no need to be so particular about their surface.

The form panels are prefabricated in a central carpenter yard, where power saws and lumber are located. They are then trucked to the job, set up, and held in place usually with two 2 x 6 lumber.

(Concluded on next page)

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Big Pile-Driving Job On Housing Project

(Continued from preceding page)

braces which completely encircle the form. Steel bolts at the corners of the brace hold the belt very tight.

For an average 4-cubic-yard batch of 3,000-pound concrete, the mix consists of 2,202 pounds of cement, 5,700 pounds of sand, 4,828 pounds of 1-inch-maximum rock, and 2,416 pounds of pea gravel.

The concrete aggregates and cement are being furnished by several Los Angeles commercial firms, trucked to the site, and delivered to a big Conveyco manual batch plant. The aggregates are dumped over a tunnel and hoisted by conveyor to the bins at the top of the plant. A 2,000-barrel bulk-cement silo and a smaller 125-barrel transfer silo take care of the cement. The batches are dumped to a fleet of eight truck-mixers owned by Consolidated Rock Co., Blue Diamond Corp., or Graham Brothers, all of whom are active on the job.

The concrete is being placed in the forms by methods conventional with truck-mixers. It is sometimes dumped directly; sometimes chutes are used to train the concrete where it must go; sometimes a Gar-Bro transfer hopper and rubber-tired concrete buggies must be employed. In all cases the material is handled speedily, vibrated by Viber electric vibrators, and the top laitance removed by an air-water jet to insure good bond with the next lift.

Pyramid waterproofing compound is also being used in the concrete, especially in the areas where ground water has been a problem.

Personnel

The Parklabrea Project construction is under the general supervision of R. E. Doherty of the New York office of Metropolitan Life Insurance Co., with C. J. Chambers in charge of field operations as the owner's Superintendent. M. R. Wadsworth is his assistant, and pile-driving operations are under the general supervision of L. T. Evans, Founda-



C. & E. M. Photo

C. J. Chambers (right) is Superintendent on the Parklabrea Project for Metropolitan Life Insurance Co., in charge of field operations, and M. R. Wadsworth is his Assistant Superintendent.

tion Engineer.

For the general contractor, J. H. Griffith is the Superintendent. Frank Davis is the Los Angeles area General Superintendent for the Raymond Concrete Pile Co., and Carl C. Johnson is the Job Superintendent.

Road Group Formed in N.Y.

The recently formed New York Good Roads Association, Inc., has opened its offices at 116 Washington Ave., Albany, N. Y. Anticipating an overall membership of more than 500,000 residents of New York State, the new association will seek to develop greater interest in the important part played by public highways in the economic welfare of the people. Charles H. Sells, formerly New York State Superintendent of Public Works, has been appointed Executive Director. Robert J. Shillinglaw, formerly Director of the Bureau of Public Relations of the New York State Department of Public Works, has accepted a similar post with the NYGRA.



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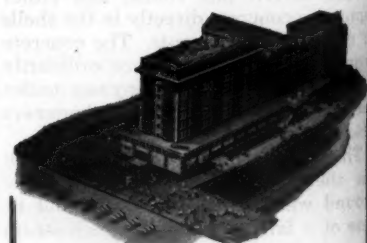
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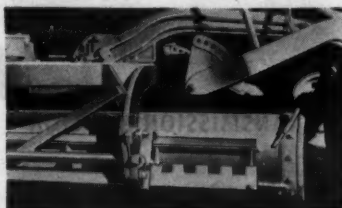
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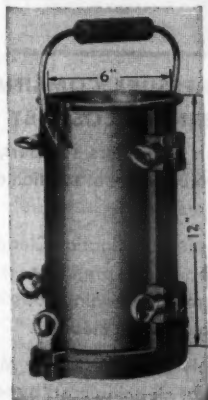
Large maps, tracings, and drawings are unhandy and cumbersome to handle, but an all-metal filing cabinet to simplify their storage and location is manufactured by the Scott-Rice Co., 617 S. Main, Tulsa, Okla. The Scott-Rice cabinet features the use of fiber tubes in which the rolled drawings and prints can be stored.

The Tubefiles are designed to store prints in lengths equal to the clear height of the inside of the cabinet. The tube racks are set on hinges so that they tilt forward for easy access, and the tubes are numbered and lettered to permit easy reference. Several drawings can be put in each tube.

The Tubefiles are made in two sizes for both field and permanent installations. The No. MT-4 is a double-door unit measuring 36 x 18 x 78 inches high. It has a capacity of 112 tubes of 2-inch diameter and 36-inch length, and there is a shelf near the top for storing file indices and other miscellaneous matter. The No. MT-2 is a single-door unit measuring 24 x 15 x 66½ inches high. It has a capacity of 56 tubes of 2-inch diameter and 36-inch length. The files are furnished in olive green or gray finish.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 53.

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Diesel Unit Yields Two Kinds of Power

A combined power unit capable of providing both electricity and mechanical driving power is announced by the Murphy Diesel Co., 5317 W. Burnham St., Milwaukee 14, Wis. The Mech-Elec units are especially designed for applications where the advantages of mechanical drive are desirable for the major load, but where the flexibility of electric power is also desirable for secondary loads.

These diesel-powered units are currently available in two models: the Model ME-6 which has a rating for continuous operation of 135-hp and a rating for intermittent operation of 160-hp; and the Model ME-66 with a rating of 150 hp continuous; and a rating of 180 hp intermittent. Both models are equipped with 50-kw generators.

The Mech-Elec units will handle any fixed or variable proportions of mechanical and electrical loads, the manufacturer states. However, the combined

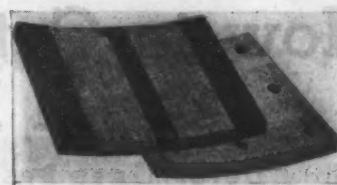
mechanical total cannot exceed the rated capacity of the engine, and the electrical load cannot exceed 50 kw. The generator is designed so that it can be operated without engaging the mechanical drive.

Further information on this combination power unit may be secured from the company, or by using the Request Card at page 16. Circle No. 107.

New-Type Brake Block

Brake blocks made from a combination of woven and molded asbestos materials are announced by the Gatke Corp., 224 N. LaSalle St., Chicago 1, Ill. The MW brake blocks are non-compressible, says Gatke, and their molded backing provides a secure anchorage so that bolt heads will not pull out. The blocks are precision-molded to size and drum curvature for easy installation and accurate fit without wear-in.

The woven and molded materials are combined in proper balance for specific



In the new Gatke MW brake blocks, woven and molded asbestos materials are combined in the proper balance for specific uses.

applications. The woven material, for example, provides quick, positive engagement; the molded, a smooth, non-grabbing action. Varying the composition and the proportion of these two materials makes it possible to adjust the brake blocks to specific service applications. The proper degree of drum conditioning can be provided to assure frictional stability and to avoid glazing on any kind of drum, the manufacturer states.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 46.



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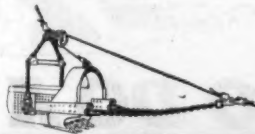
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are included in the editorial columns of Contractors & Engineers Monthly this month. In each case, further information or printed matter is available without charge or obligation to interested C. & E. M. readers. Write direct or circle the corresponding number on the reply card bound in at page 16. Our Readers' Service Department is becoming increasingly an Information Headquarters for contractors, highway engineers and distributors.

**CONTRACTORS
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How to Get the Best Aerial Photography

Study Determines Best Scale, Focal Length, Etc., For Aerial Photos Used In Highway Location Work

THE Massachusetts Department of Public Works recently undertook a thorough study of aerial photography and its applications to highway design and location work in the state. Though the Department has used aerial surveys of various kinds in the past, it did not believe full advantage had been taken of all the potentialities of the new medium. Accordingly, it set out to determine how specifications should be drawn so that the resulting pictures would be of maximum value to the Project Division. Results of the study were reported by Elmer C. Houdlette, Department Director of Surveys, at the recent convention of the Association of Highway Officials of the North Atlantic States in Boston.

As the first step, the Department entered into a contract with the Institute of Geographical Exploration of Harvard University. Under the terms of this contract, aerial photographs were taken along designated routes where actual planning was in progress. The resulting pictures were then used by the engineers on the various projects. The advantages or disadvantages of a particular type of photograph were then determined through actual experience, so that drawbacks would be eliminated and advantages included in future work.

Problems Investigated

Data were sought on the following problems: (1) The most suitable scale—taking scale and degree of enlargement; (2) the most suitable focal length; (3) the most suitable season; (4) the most desirable film and filter combination—black-and-white, and color; (5) specifications for contact prints; (6) methods of numbering and indexing; (7) most suitable types of mosaics for various situations; (8) methods of presenting topographical data; and (9) possible applications of oblique photography.

Extent of the Study, Equipment

The aerial work consisted primarily of vertical photography at various scales with cameras of different focal lengths. A total of 525 linear miles was flown, and approximately 110 obliques—both black-and-white and colored—

were taken of selected areas and routes. Approximately 5,500 contact prints and more than 350 enlargements (varying in size from 16 x 20 to 40 x 40 inches) were delivered. Both controlled and uncontrolled mosaics were made to investigate the suitability of each for the work of the Department.

The following aerial cameras were used in the course of the tests: Fairchild K3B with 8 1/4, 12, and 24-inch cones; a precision mapping camera with 12-inch lens; Fairchild F-4 fitted with 12-inch lens and focal plane shutter; Fairchild F-8 fitted with 10-inch lens.

Most Suitable Scale

In determining the most suitable scale for aerial photos, certain general principles were kept in mind. The taking scale of the original negatives should be large enough so that ground objects of importance to the engineer can be easily seen under the lens stereoscope. It should be large enough to permit satisfactorily sharp blow-ups of critical areas for detailed delineation of property holdings, acreages, etc. But it should also be as small as possible, since fewer pictures are required with a smaller scale, and the cost of the work is materially reduced.

To test this problem of scale, Route 15 from the Connecticut line to Sturbridge was flown at 800, 600, and 400 feet per inch. The contact prints were then compared under the stereoscope by various engineers. Also, prints were made at 400, 200, and 100 feet from negatives with different taking scales to study the relative sharpness with different amounts of enlargement.

The results indicated that for rural sections a taking scale of 600 feet was sufficiently large, and the 5,400-foot width covered by the strip would be enough for most needs. Several proposed routes through rural areas were flown at the 600-foot scale, and planning requirements made it necessary to prepare enlargements and mosaics of certain critical areas to 200 feet per inch. It was concluded that enlargements of at least three diameters were entirely feasible.

In urban areas where land values are high and buildings close together, scales of 100 feet or larger are necessary. A portion of Boston was flown at 400 feet per inch, and a mosaic laid at 100 feet proved to be entirely satisfactory.

High shutter speed is important with

large scales. Pictures taken of the same area and by the same camera were made at 200 feet per inch with shutter speeds of 1/450 and 1/200 second. These were enlarged to 30 feet per inch, and the increased sharpness with short exposures was readily apparent.

Most Suitable Focal Length

Several factors had to be considered when selecting the focal length of the lens to be used: the flight altitude to give the required scale; the relief displacement; and the tilt displacement.

(Continued on next page)



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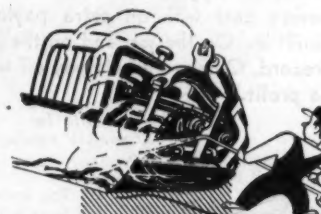
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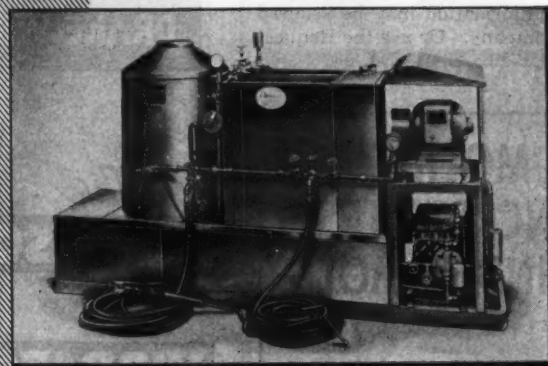
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In the large-scale flying undertaken for highway location studies, the problem is not to get an airplane that will go high enough, but rather to use a lens that is long enough to put the plane in smooth air so that tilts will not be excessive. Work with an 8 1/4-inch lens during the Massachusetts tests showed clearly that flying heights are so low that rough air is frequently encountered. With a 12-inch or longer lens, flying conditions were excellent on all except two occasions.

With photographs taken at a pre-determined scale, the displacement of objects caused by relief varies inversely as the focal length. Since the smaller the displacement the more satisfactory the pictures for the type of work under consideration, lenses with a long focal length are desirable.

As for tilt effect, the amount of tilt displacement with lenses of varying focal length showed the distinct advantage of using the long lens.

Most Suitable Season

The most suitable season for aerial photography occurs, of course, when foliage and snow cover do not obscure ground detail and when there is reasonable expectancy of cloudless weather at frequent intervals.

To determine how much of a disadvantage full foliage is for highway location studies, comparison strips were flown over a given area when the leaves were fully out and when the trees were bare. A representative portion of the line was studied under the stereoscope and all visible features of significance were traced when the trees were bare and when they were in full foliage. The main omissions caused by vegetation cover were fences, stone walls, brooks, ditches, and ledge outcrops. These are important, since fences and stone walls assist in locating property lines, while brooks and ledge outcrops may present engineering problems.

As for snow cover—on comparison strips made near Sturbridge, some features were visible on pictures taken when there was snow which could not be seen when the ground was bare. However, long tree shadows on the snow presented a very unnatural impression that made interpretation difficult and made the pictures of far less value for soil identification.

On the whole, the tests indicated that air work should be limited to the period between defoliation and snow in the fall, and between the melting of the snow and foliage in the spring. Two maps were prepared to show the dates when snow and foliage conditions in Massachusetts should be suitable for aerial photography. To prepare these maps, snow measurements had to be made throughout Massachusetts as well as a series of phenological records for the same area. The two maps, one for the spring period and one for the fall, show that there is a statewide period of approximately two months in the spring and one month in the fall when photographs may be taken under the conditions which experience has shown to be ideal.

Film and Filter Combination

As Mr. Houdlette points out in his report of this study, the film and filter combination should give maximum resolution of detail and should have sufficient exposure latitude to be practical for routine operations.

One function of a filter is to increase the apparent contrast of the subject and so make it easy to recognize different objects. When using filters with panchromatic film, it is convenient to remember that an object which has the same color as the filter itself will appear lighter, while an object that has the color the filter absorbs will appear dark. If red and blue objects are photographed with a red filter, the red object will be light and the blue object dark.

A second and very important function of filters in aerial photography is to decrease the effect of atmospheric haze which frequently reduces visibility and tends to cause dull and indistinct pictures. Yellow and red filters are frequently used so that the effect of haze is much less pronounced.

In addition to an almost complete absence of detail in the shadows, infrared pictures through yellow or red filters are characterized by their tone rendering of the vegetation. The almost complete reversal of tones, except for the small clumps of evergreens and the streams, makes the infrared picture difficult to interpret and so lowers its effectiveness for highway location studies.

Obliques and verticals taken with Kodachrome film were easy to interpret because of the sense of reality that comes when objects are reproduced in their correct color. But when they were compared with black-and-whites of the same area, they showed no difference

(Continued on next page)



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advanced engineering features for better performance, longer life, more profits for users

The new Model M-49 Schield BANTAM now combines many more big machine features with the basic design which has made it the outstanding machine of its type. Jack, drum, and swing shaft assemblies are now mounted on heavier Timken tapered roller bearings. Drums, swing gears, and vertical swing shaft roll on sealed-for-life pre-lubricated ball bearings.

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How to Get the Best Aerial Photography

(Continued from preceding page)

in color pattern that was not represented by a corresponding difference in tone on the black-and-whites taken on panchromatic film.

Specifications for Prints

It was found during the tests that white photographic paper is best for highway location studies, and that the greater stiffness, durability, and dimensional stability of double-weight paper makes it preferable to single-weight. It was also found that the best paper surface to meet the particular needs was semi-matte. Prints made on a glossy surface showed a little more very fine detail and had a slightly greater contrast than if a luster surface had been used. But the glossy paper prevented the use of pencils when annotating the pictures.

Papers are also made in varying grades of contrast. Experience working on the various jobs indicated that prints having a full range of tones from white to black and exhibiting what might be called "average contrast" gave the best results.

Numbering, Indexing Negatives

The Massachusetts Department of Public Works found that the most satisfactory system for numbering negatives was to have each negative carry the date and the project number, plus the serial number indicating its position in the sequence of pictures. In addition, the time, scale, and focal length is marked on the first and last picture of each flight strip.

After trying several methods of indexing prints, the Department came to the conclusion that the best results were obtained when (1) the centers of every other photograph were plotted on a Geological Survey map, (2) the centers were then connected by a line indicating the general course of the air-plane, and (3) the area covered by a single picture was outlined at intervals to show the width of the strip.

Mosaics

Mosaics are used to present cultural information about large areas that cannot be included in one picture. Their accuracy depends on ground control—those points which can be identified readily on an aerial photograph and whose horizontal positions are known. Massachusetts, said Mr. Houdlette, is in a particularly favorable situation concerning ground control, since the coordinates of more than 5,500 points are on file. There are few places where highway surveys are run that are not tied to horizontal control.

When the photographs are oriented on their flight lines and no ground control is used, there will be errors in both scale and azimuth. Accordingly, if a grid is superimposed from map coordinates of a few prominent features, errors in position of 150 feet or more are to be expected at a few random points. However, such an uncontrolled mosaic may be assembled quickly and cheaply, and the Department found that it proved very useful in conferences to study the properties affected by various suggested locations.

A semi-controlled mosaic was laid showing Route 15 from the Connecticut line to Sturbridge. Variations in elevation throughout the job did not exceed 400 feet, nor 200 feet in the area covered by one picture. A Massachusetts grid was constructed at a scale of 400 feet per inch, and six transverse stations along the present highway were plotted by their coordinates on the grid and picked on the contact prints from the descriptions.

As the taking scale was 800 feet per inch, it was necessary to enlarge the pictures. The average amount of this

enlargement for each portion of the strip between control points was determined by comparing the distance between control points as measured on the grid and as measured on the contact prints. Each print used for the compilation was enlarged by a ratio that would yield good image match with adjacent prints, and yet maintain the average ratio for the particular section of the strip.

Twenty-one negatives were used and the final mosaic was about 9 feet long. To check the accuracy of this compilation, grid coordinates of 21 points as determined from the mosaic were compared with those obtained from the Geological Survey map. The maximum error was 125 feet and the average error 62.3 feet, while 90 per cent of the points had an error of 100 feet or less.

A controlled mosaic was also compiled of the General Edward Lawrence Logan Airport in East Boston where positions and directions were important. Here a radial-line plot was required to give positions of nine points on each print; the radial-line plot was adjusted to ground control established by triangulation. The mosaic consisted of 64 pictures compiled by ratioing each individual print to its appropriate size. A check on 30 random points indicated an average error of 26.9 feet and a maximum error of 50 feet.

Topographical Detail

Mosaics show the culture and its relationship to the proposed location, but they convey very little information about the topography, which is generally an important factor. It is true that pairs of individual pictures examined under a stereoscope show the relief, but actual elevations cannot be determined. And there is the great disadvantage of being able to see only short sections of the line at one time, with the consequent difficulty of obtaining a complete overall knowledge of the terrain.

Two methods of presenting topographic information in conjunction with the mosaic were tried. First, a semi-controlled mosaic was laid at a scale of 600 feet per inch so that images of prominent features would fit their position as determined from a Geological Survey map. The map was then enlarged to the scale of the mosaic, and the two were mounted one above the other so that the elevation of any point on the mosaic could be determined by

projection.

The second method consisted of laying a mosaic to match a Geological Survey sheet. Contour lines and a few prominent features were traced from an enlargement of the map. These contours were then copied and positives made on process film, using a dye-

coupler developer to give the contours sufficient color to afford contrast. The contoured overlay was then fixed to the edge of the mosaic so that it could be turned back out of the way when not needed, or dropped into position to study the topography.

(Concluded on next page)

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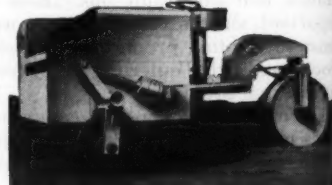
- Lay more stone—faster—with this APSCO Base Paver. Join the many contractors who have found the APSCO way is the profit way!
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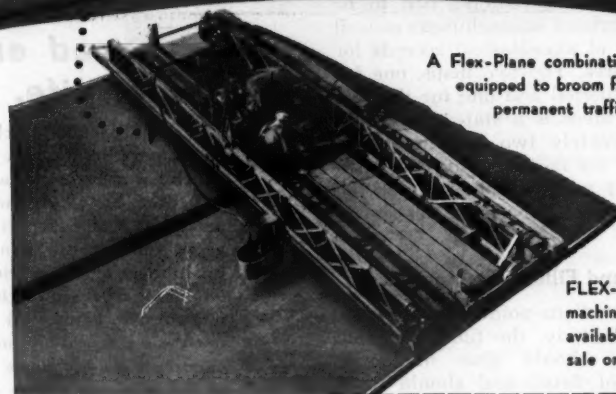
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Obliques

Obliques are easier for the layman to understand than are verticals. Therefore they have a definite value at hearings where it is desirable to explain to the public exactly why a certain location was selected and to show which properties are affected.

Obliques with a 12-inch lens at altitudes from between 400 and 500 feet were taken at about 1,000-foot intervals along the route of the proposed expressway in East Boston to show the types of buildings that would be affected. The resulting pictures, when used in conjunction with verticals of the same area having the takings delineated, proved eminently satisfactory for presentation at the hearings. Not only were the prints available for individual study, but lantern slides were projected on a screen so that the entire group could be "briefed" at one time.

Conclusions

The Department's experience with the different types of pictures and mosaics indicated the following conclusions, according to Mr. Houdlette:

1. The most suitable taking scale for urban work is 400 feet per inch. For rural work a taking scale of 600 feet is sufficiently large. Under normal conditions, negatives should not be enlarged more than three diameters; however, enlargements of four or six diameters of critical areas are entirely usable if the original pictures were taken with a high-speed shutter.

2. The aerial camera should have a focal length of 12 inches or more.

3. The most suitable season for aerial photography occurs when the leaves are off the trees and there is no snow on the ground. Every effort should be made to plan the projects sufficiently in advance to permit photography under these conditions.

4. Panchromatic film should be used for the black-and-white photography, and in rural areas the choice of filter should be left to the contractor so that he may use the one that will best meet the haze conditions existing on each flight. In urban areas where high buildings will cast long shadows, the contractor should be limited to the use of yellow filters, and these should be permitted only when the resulting photographs contain sufficient shadow detail to satisfy the engineer. Infrared film should not be used. Color photography should be confined to pictures needed for use in public hearings where the added sense of reality inherent in color would justify the added expense.

5. Contact prints should be on double-weight paper for durability and dimensional stability, and the surface should be semi-matte to permit easy marking and reduce objectionable reflections.

6. Each negative should be marked clearly with the project number, the serial number of the particular negative within the project, and the date of photography. The first and last negatives of each strip should also show the time of exposure, the scale, and the focal length of the camera used.

For the index map, the appropriate Geological Survey sheet should be used as a base, and the centers of every other photograph plotted, numbered, and connected by a straight line to indicate

the general path of the airplane. In addition, the area covered by the first and last picture on each strip should be outlined on the map. Photographic reproductions should then be made on Ad-Type (or equal) paper to permit the prints to be folded without cracking.

7. The requirements of a particular project will determine whether an uncontrolled, semi-controlled, or controlled mosaic will be needed.

8. Topographical information about a proposed location may be presented by reproducing the Geological Survey map above or below the mosaic, or the contours may be reproduced on a transparent overlay kept in register with the mosaic.

9. Oblique photographs serve a useful purpose in planning interchanges and illustrating proposed takings at public hearings. Such obliques should be taken with a camera having a focal length of 12 inches or more. The flight altitude for 12-inch lenses should be 1,000 feet in rural areas and 500 feet in

urban areas, where property values are high. The altitude may be increased proportionally with longer lenses.

10. The greatest difficulty in Massachusetts is to find engineers in the Department who can interpret aerial photographs accurately and extract all the information they contain. Mr. Houdlette believes that a selected personnel should be given elementary practical instruction in photo interpretation, the use of the stereoscope, radial-line plotting, and assembly of mosaics. They will then be in a position to use aerial photographs with assurance and precision.

New Holland Sales Mgr.

Lyle T. Hanse is appointed a District Sales Manager of the New Holland Mfg. Co., Mountville, Pa. He is in charge of sales of New Holland pit and quarry equipment in North and South Dakota, Nebraska, Wisconsin, upper Michigan, Minnesota, Iowa, Illinois, Missouri, Kansas, and Indiana.

Light-Duty End Loaders

A light-duty front-end loader is described in a 4-page bulletin issued by the Arrow Contractors Equipment Co., 2020 Walnut St., Chicago 12, Ill. The Arrow-Loader is powered by a 12-hp gasoline engine and has a lifting capacity of 1,200 pounds.

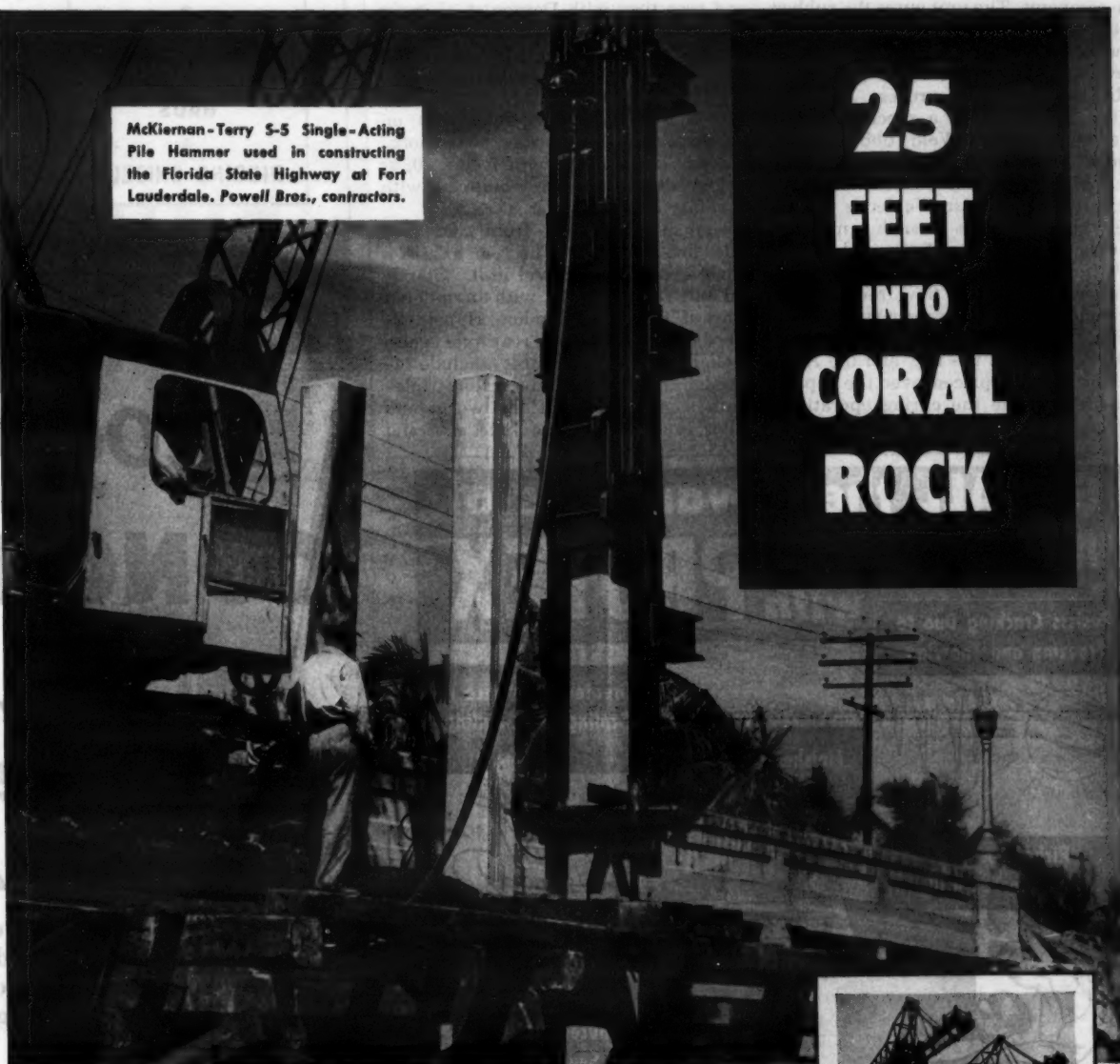
The catalog shows a side view of the Arrow-Loader which is tied in with eight short descriptive paragraphs about the various features claimed for the unit. Other photographs show the loader in use on four types of materials-loading and hauling operations.

Specifications cover bucket capacity and lifting height, type of operation, power unit, clutch, transmission, final drive, brake, front driving wheels, rear caster-type steering wheel, turning radius, clearance, dimensions, and weight.

Copies of literature on the Arrow-Loader may be obtained from the company. Or use the enclosed Request Card. Circle No. 6.

McKiernan-Terry S-5 Single-Acting Pile Hammer used in constructing the Florida State Highway at Fort Lauderdale. Powell Bros., contractors.

25
FEET
INTO
CORAL
ROCK



To drive 35-foot concrete piles, 16 inches square, 25 feet down into coral rock called for a highly dependable hammer. That is why the contractors used this McKiernan-Terry Single-Acting Pile Hammer, with striking energy of 16,250 foot-pounds per blow, for this Florida highway project.

McKiernan-Terry Single-Acting Hammers are specially designed for handling heavy mass piles, such as concrete, and for driving into dense, difficult soils. They are supplied in a line of five standard sizes.

The McKiernan-Terry line also offers Double-Acting Hammers in ten standard sizes and Double-Acting Pile Extractors in two. Thus engineers and contractors are always able to find a McKiernan-Terry Hammer or Extractor of the right size and power for any specified job.

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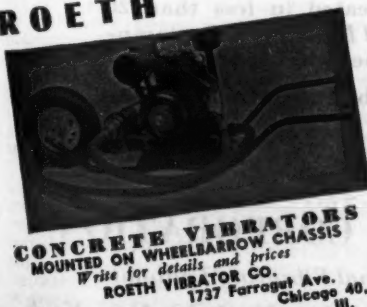
Write for latest literature giving facts and specifications on the McKiernan-Terry Pile Hammer line.



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On-the-job tire repairs can be made, without removing the tire from the vehicle, with the Schlegel Air-Welder vulcanizing unit. Goodyear makes the Air-Weld rubber used in the process.

Tire Cracks Repaired With New Vulcanizer

A vulcanizing unit for repairing tire tread and sidewall cuts is announced by R. E. Schlegel, Inc., 114 E. Exchange St., Akron, Ohio. The Schlegel Air-Welder makes it possible to repair tires without removing them from the vehicle, says the company. The unit cures the rubber patch without pressure and can be used wherever a 110-volt 60-cycle electric current is available.

In the Air-Weld process, the tire injury is filled with a special type of filler known as Air-Weld rubber, which is made by the Goodyear Tire & Rubber Co. After the cavity is filled with Air-Weld rubber, the Air-Welder is placed over the repair area in such a manner that the edges of the cone are about $\frac{1}{4}$ or $\frac{1}{2}$ inch from the tire surface, in order to allow the hot air to flow freely out of the cone. When the repair rubber becomes soft, it is rolled down to conform to the contour of the tire, and the Air-Welder is again placed over the repair area to continue the curing operation. Curing times vary from 1 to 3 hours

depending on the depth of the repair.

A complete Schlegel Air-Weld kit consists of the Air-Welder vulcanizing unit, a $\frac{1}{4}$ -inch electric drill with adapter and one rasp, and a supply of the Schlegel Air-Weld rubber and cement.

Further information may be secured from the company, or by using the Request Card at page 16. Circle No. 122.

New Line of Trucks In $\frac{3}{4}$ to 2-Ton Range

A $\frac{3}{4}$ to 2-ton truck is being made by the Federal Motor Truck Co., Detroit 9, Mich. It has a gross vehicle weight of 12,000 to 14,500 pounds depending upon tire size. The gross combination weight with dual rear tires is 28,000 pounds. The Model 15M is available in five wheelbase lengths: 135, 146, 167, 180, and 194 inches.

Power is provided by a 6-cylinder Hercules engine which develops 93 hp at 3,400 rpm and 184 foot-pounds of torque at 1,400 rpm. The 15M has an 11-inch clutch with 131.4 square inches of lining area, and 6:50 x 20 single front and rear tires with Dayton steel-spoke wheels. Tires from 6:00 x 20 to 7:50 x 20, and Budd wheels, are also available. Units equipped with 7:00 x 20 tires, or larger, include a Hydrovac vacuum booster as standard equipment; on smaller tires the booster is optional at extra cost. Units with 7:00 x 20, or larger, dual tires are equipped with auxiliary rear springs as standard.

Timken wide-track front and rear axles are standard. The rear axle is a single-speed spiral-bevel unit. Standard axle ratio is 5.67:1, with an optional ratio of 6.67:1. A Timken Hypoid 2-speed double-reduction rear axle is also available. Other features include 4-speed transmission, anti-friction triple-tooth steering gear of the worm and roller type, Federal de luxe cab, and

fast-acting dual primary hydraulic brakes.

Further information may be secured from the company, or by using the Request Card at page 16. Circle No. 79.

Light-Duty Earth Scoops

Light-duty earth scoops in two sizes are described in a 4-page folder issued by the Southern Welding & Machine Co., P. O. Box 99, Charlottesville, Va. The catalog pictures the Speed Scoops in use in dumping, loading, and spreading operations. Photographs also show its ground clearance when in the carry-

ing position, the depths of cut possible, and the location of the hydraulic pump.

Specifications listed cover capacities, tractor power, rotation of the bowl, height of dump, clearances, hydraulic jacks used to raise and lower the bowl and to dig and dump, working oil pressures, and complete dimensions and weights of the scoops. These specifications are listed for both the 1.6-yard Model J-2 and the 4.1-yard K-2. General features and specifications are also described.

This literature may be obtained from the company. Or use the Request Card at page 16. Circle No. 86.



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Name _____ Address _____

Avoid Legal Pitfalls

Edited by A. L. H. STREET, Attorney-at-Law

These brief abstracts of court decisions may aid you. Local ordinances or state laws may alter conditions in your community. If in doubt consult your own attorney.

Liability of Contractors Under Delay Damage Clause

THE PROBLEM: The Government notified contractors on a highway project that it could not make the agreed monthly progress payments because of lack of funds. But the contractors elected to proceed instead of asking for a shutdown order which would have stopped the running of the contract time.

Because of delay in starting work, and slowness in prosecuting it, the contractors could not complete the job within the contract time. After the contract time had expired, and when the work was only 37 per cent complete, the Government authorized suspension for several months until spring—partly because of approaching winter, and partly because the contractors declared they could not proceed without progress payments.

Payments for work done in September and October were made the following March. Work was resumed June 1 and completed in August. To cover the 93-day delay in performance beyond the contract time—not counting the time the work was suspended—the Government withheld \$9,300, or \$100 a day according to the terms of the contract.

(1) Did the Government's failure to make agreed monthly progress payments debar it from enforcing against the contractors this agreement to pay \$100 daily for delayed completion of the job? (2) Was an award of \$9,300 damages excessive where the contract price was \$47,802.52?

THE ANSWERS: No, on both points, decided the United States Court of Claims. (*Dineen v. United States*, 71 Fed. Supp. 742.)

(1) Plaintiff argued that the Government's failure to make progress payments and to give the shutdown order constituted breaches of the contract; that the Government was therefore debarred from assessing liquidated damages, under Article 9 of the Government's standard contract.

But the Court of Claims said: "That article was interpreted in *United States v. American Surety Co.*, 322 U. S. 96 . . . as not permitting the Government to terminate the contract for cause and also assess liquidated damages. But in this case the Government did not terminate the contract. It probably would have been entitled to do so, because of the contractors' tardiness in performance. But it only issued a suspension order, and the plaintiff, after the suspension, resumed performance and completed the work. Its intermediate request that the Government terminate the contract was not granted. The contract therefore remained in force, including its provision for liquidated damages."

(2) On the second question, plaintiff cited the rule that an agreement to pay damages which manifestly and grossly exceed actual damages will not be enforced. It argued that the \$9,300 liquidated damages assessed amounted to a penalty in proportion to the total contract price as reduced by the Government's change order—\$47,802.52.

The court replied: "We do not know whether the Government was damaged by the delay nor, if so, how much. The difficulty of determining these questions is the reason and justification for the insertion of the agreement for liquidated damages."

Bidder Makes a Mistake; Fails to Recover Deposit

THE PROBLEM: On the opening of sewer construction bids, the lowest bidder discovered that he had omitted to include the cost of dewatering trenches. But he failed to notify the city of his mistake or to ask to be relieved from his bid until nearly three weeks later, after the contract had been awarded him. Under these circumstances was he entitled to return of the 5 per cent deposit that accompanied the bid?

THE ANSWER: No, decided the New York Supreme Court, Schenectady County. (*Bren-dese v. City of Schenectady*, 85 N. Y. Supp. 856.)

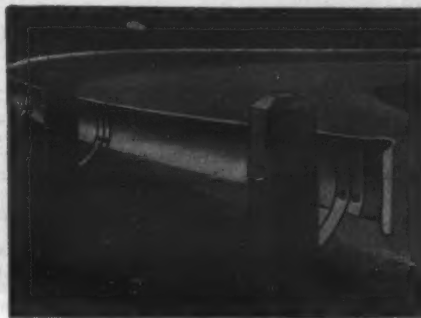
The court found that plaintiff contractor did make a mistake in bidding, from which he could have released himself had he acted promptly. But it decided that forfeiture of the deposit was proper because he did not act promptly, and because the amount of the deposit was not unreasonable nor grossly disproportionate to the loss suffered by the city through plaintiff's refusal to enter into a contract. Said the court:

"Notices to bidders to compete for public construction must be prepared in such a manner as to protect the city from default on the part of bidders and the expense incident thereto, and it was competent for these parties to enter into such a provision for liquidated damages in the event of default. A proper view of the whole procedure is that there were effected two different contracts.

One of these was when the city advertised its notice to bidders, and the bidders, accepting the offer to receive bids, did submit their bids. . . . The other contract in contemplation was the contract to be entered into between the city and such person or persons as submitted a bid acceptable to the city. The result is that, while it might be found . . . that the latter contract was subject to cancellation on the ground of mistake on the part of the bidder, the former contract remained, and the deposit . . . was a part of the contract. The deposit in this case must be considered as liquidated damages rather than a penalty."

But the court intimated that had plaintiff acted promptly to be relieved from his bid he might have been entitled to return of his deposit. "Had the plaintiff promptly notified defendants of his mistake, they would have been in a position to permit him to withdraw

(Concluded on next page)



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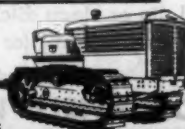
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Avoid Legal Pitfalls

(Continued from preceding page)

his bid, or to reject and to award the contract to another bidder before they committed themselves both to him and the other bidders by the award to him."

The court added that there was no showing on the part of the plaintiff that when he notified the city of his mistake, it could have made an award to one of the other bidders. "As a matter of common knowledge and understanding of the procedure in such instances, we may safely assume that at that date the city had no other alternative than to readvertise for bids with the attendant additional expense and uncertainties of cost."

Court of Claims' Power As to Outlawed Claims

THE PROBLEM: Under the Federal statutes authorizing the Court of Claims to render judgments against the Government on contract obligations, could a Senate resolution confer power on the Court to adjudicate a contractor's claims for additional compensation that were outlawed or had not been submitted for administrative decision as provided by the contract?

THE ANSWER: No, but the Court determined whether the claims were meritorious to aid Congress in exercising its discretion to provide for payment of the claims. (First-Citizens Bank & Trust Co. v. United States, 76 Fed. Supp. 250.) The trust company sued as administrator of the deceased contractor's estate. Said the Court of Claims on this aspect of the case:

"Many of plaintiff's claims involve a demand for equitable adjustment of the contract price on account of alleged increases in the cost of performance due to changes or extras not directed in writing or not timely protested, or not submitted to the contracting officer for decision, nor appealed to the head of the department concerned, as provided for in the contract. The provision of the Senate Resolution that the Court shall . . . report to the Senate, 'irrespective of any statute-of-limitations bar, and irrespective of any administrative requirements or contractual provisions relating to notice of protest as to filing claim therefor', does not remove the bar of the statute nor cure the failure of the plaintiff to follow the administrative procedure provided in the contract for adjusting matters of dispute, so as to give the plaintiff a claim, legal or equitable, upon which this court can render judgment. When the contractor chooses without due cause to ignore such contract provisions for settling disputes under the contract, it is error for the Court of Claims to entertain and decide the claims involving those disputes however meritorious the claims may otherwise be. . . ."

"The matter of reimbursement to plaintiff with respect to any of the items involved in this proceeding lies, therefore, solely within the discretion of Congress. To that end we proceed to a consideration of the nature . . . of the various items making up the claims, in order to give Congress our conclusions whether, on the basis of the facts found, any of the claims are meritorious and whether there are any amounts legally or equitably due from the United States to the claimant, notwithstanding claimant is not, for the reasons indicated, entitled as a matter of law to a judgment of this court."

In support of the above quoted conclusions, the Court of Claims cited a decision of the United States Supreme Court to this effect: that the Court of Claims has no jurisdiction of a contractor's claims which have not been submitted for determination by the contracting officer, subject to appeal to a department head, as provided for by the contract—unless it be shown that such procedure was inadequate or unavailable. (United States v. Joseph A. Holpuch Co., 328 U. S. 234, 90 L. Ed. 1192.)

Building-Trade Custom Forbade Bid Withdrawal

THE PROBLEM: In the light of a building-trade custom, did a subcontractor have the right to withdraw a bid made to a general contractor after the latter had contracted with the owner on the faith of that bid?

THE ANSWER: No, according to the United States District Court, Eastern District of Louisiana. (R. P. Farnsworth & Co. v. Albert, 79 Fed. Supp. 27.)

The court rested its decision upon this ground: "It is a universal custom in the building trade in Louisiana that when a subcontractor furnishes a bid to a general contractor, it is considered irrevocable after that bid has been used in the preparation of the general contractor's bid to the owner; and that if the subcontractor does not intend to be so [bound] it is customary for him to so state in his bid."

The court followed the reasoning of a Louisiana Court of Appeals in a case involv-

ing a similar factual situation. (Harris v. Lillis, 24 So. 2d 689.) "In that case," observed the court in the first cited case, "the defendant [the subcontractor] conceded that he probably had made a mistake in agreeing to do the work for the price stipulated. And the Court of Appeals, after stating that the case appeared to be one where the subcontractor was seeking to recant from his engagement because he had made a mistake in offering to do the work for an unprofitable price, said: 'It is clear that such a defense cannot be countenanced.'"

Subcontractors Liable When They Abandon Job

THE PROBLEM: Less than three months after commencing work on a sewer, subcontractors removed their equipment, ceased work, and refused to return, although the work was required by the subcontract to be completed shortly thereafter. Was the prime contractor entitled to treat the subcontract as abandoned and to hold the subcontractors liable for the increased cost of completing the work?

THE ANSWER: Yes, decided the New York Supreme Court, Queens County. (Catapano v. Clemente, 85 N. Y. Supp. 2d 764.)

Accordingly, the subcontractors were denied right to a lien for work done before abandoning the job. But, because the prime contractor was bound to furnish supervision and all materials (the materials were on hand when the subcontractors abandoned the job) the court decided that the contractor could not hold the subcontractors liable for the cost of supervision or increased cost of materials.

This decision was affirmed by the Appellate Division of the New York Supreme Court (274 App. Div. 995, 85 N. Y. Supp. 2d 514).

Contractor's Liability In Blasting Near Houses

THE PROBLEM: Suit was brought against a contractor for damage to a near-by house, caused by blasting. Did the evidence show such departure from standard blasting methods as to justify a jury in deciding in the property owner's favor?

THE ANSWER: Yes, according to a decision of the New Jersey Superior Court, Appellate Division. (Balinski v. A. Capone & Sons, Inc., 63 Atl. 2d 810.)

An experienced engineer testified that, as a matter of standard practice, lighter charges should have been placed in holes drilled 6 inches apart, in line drilling within 8 feet of the house. The court said that this testimony—plus the contractor's testimony that the holes were drilled "6 or 7 inches" apart, without showing how large pieces of rock were blasted—warranted a finding of negligence on the contractors' part. The decision was also influenced by testimony of plaintiff's expert to the effect that damage would not have resulted if the blasting had followed

standard practice.

The court remarked that the highest court of New Jersey has "stated that while a contractor has a legal right to blast in performing his contract, he must do so with due regard to the rights of others near by, and that if negligent in not using recognized and available methods, and damages result, he is liable therefore." (Whitla v. Ippolito, 102 N. J. L. 354, 131 Atl. 873.)

In the Whitla case, a sewer contractor was adjudged liable for injury to an apartment house when he failed to follow a standard practice of channeling or line drilling before blasting. The court said that there was sufficient evidence to permit the jury to infer that "defendant failed to employ this standard modern method of performing a work fraught with danger and damage to adjacent property".



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Relocating 10½ Miles Of Old Concrete Road

Georgia Eliminates Bad Alignment on Route 12; New Black-Top Pavement To Be 24 Feet Wide

ONE of the larger road contracts under construction in Georgia last year was the 10.5 miles of grading and paving on the Covington to Madison road or State Route 12, in Morgan County, about halfway between Atlanta and Augusta. The State Highway Department of Georgia awarded the job to the Brooks Construction Co. of Atlanta, Ga., on its low bid of \$547,133.99. Work started in March, 1948, and was scheduled for completion this season within an allotted 300 working days. Entirely on relocation, the new highway lies an average of ½ mile south of the old road.

The old concrete road, 16 feet wide, was laid 25 years ago. Its alignment is typical of the time of its construction, with sharp curves, quick-breaking dips and rises on the profile, and poor sight distances in general. Its chief failing is its narrow width of pavement, now battered and cracked with the passage of the years.

The new road begins on the west at the Walton-Morgan County line, and runs easterly, by-passing Rutledge to the south. On the east it ties in to State Route 83 just outside of Madison. Over 500,000 yards of unclassified excavation is included in the contract, plus 66,357 cubic yards of subgrade-treatment material. The roadbed is 44 feet wide to accommodate the 24-foot pavement, which will be crowned 1½ inches in 12 feet, and the 10-foot shoulders on each side. From the shoulders the roadbed drops down on a 4 to 1 front slope to a 2-foot flat-bottom ditch. Back slopes are 4 to 1, 3 to 1, or 2 to 1, depending on the depth of cut.

Grading Operations

Clearing and grubbing got under way soon after the award of the contract, with a crew of about 20 cutting down the timber with crosscut saws and axes. Over 180 acres had to be cleared. Timber that was not taken away by adjoining landowners was burned, together with the brush that was dozed up into piles.

At the same time work was also started on the drainage structures. One of the major items in this phase of the work was the laying of nearly 6,000 linear feet of Armco bituminous-coated corrugated-metal pipe. There were also 14 box culverts totaling 1,345 cubic yards. A General dragline with a 70-foot boom and a ¾-yard bucket was employed for most of the excavation of the drainage structures.

Grading started April 1 and was completed October 1, 1948. Spring rains delayed it somewhat, but as the weather improved more equipment was brought in, and the work was steadily pushed, beginning at the west end and working towards the east. When a drainage structure was encountered, the earth-

moving machinery went around that site and worked on the sections in between culverts. In general the material in this part of Georgia is a red clay.

For the longer hauls averaging 1,000 feet, the contractor used three Super C Tournapulls with 12-yard LP Carryalls. They were usually assisted in loading by a Caterpillar D8 tractor pulling from the front with a steel cable. For shorter hauls, averaging 500 feet, two LeTourneau Carryall scrapers were employed—a 16-yard LP and an 8-yard LS. They were pulled by a D8 and a D7 tractor respectively, with another D8 push tractor helping to load them.

On the fills the material was dumped and spread in 6-inch lifts, with another D8 tractor-dozer leveling off the heavy red clay. Enough moisture was con-



C. & E. M. Photo

Pulling from the front with a steel cable, a Caterpillar D8 assists a 12-yard Carryall drawn by a Super C Tournapull to heap its bowl with red Georgia clay. The scene is typical of grading operations on the Brooks relocation contract.

tained naturally in the dirt so that more did not usually have to be added. Compaction was achieved with a LeTourneau sheepsfoot roller pulled by a D4 tractor. Final shaping was done by a Caterpillar No. 11 motor grader.

With this equipment working a 60-hour week, the contractor averaged 90,000 cubic yards of dirt a month.

About 15 employees, mostly equipment operators and maintenance workers, were engaged in the grading operations.

Equipment Maintenance

To keep the equipment properly fueled, 500-gallon tanks on skids were scattered about the job—they had been (Concluded on next page)

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Relocating 10½ Miles Of Old Concrete Road

(Continued from preceding page)

pulled to their locations by the tractors. Diesel fuel was furnished to the job by tank trucks of the local agent of Standard Oil Co. of New Jersey working out of Madison. The rigs were lubricated daily by an Alemite portable grease unit mounted on a rubber-tired wheel carriage frame that was easily moved about the job. Enough branch heads were strung along the project to supply water for the radiators.

All repairs to equipment were done right in the field by a mechanic and helper assigned to keep the machines in good working order. A timber A-frame was set up in a field alongside the road, and heavy parts were easily lifted out for either replacement or repairs. Welding was done by a P&H Hansen Smoothair 200-amp electric arc welder.

Base Course and Pavement

The construction of the base course and pavement was sublet by the prime contractor to the W. C. Shepherd Co., Inc., of Atlanta, Ga. (which, incidentally, was the second lowest of the five contractors who submitted bids for the job). The base course will consist of an 8-inch compacted artificial soil-bound macadam base, carried out 9 inches beyond the pavement on each side. This will be given a tar prime which will then be covered with a hot-mix binder course, Type H, 1½ inches thick. Over this will go a modified Topeka pavement, Type 1, ¾ inch thick. Mechanical finishers will lay the pavement, and the compaction will be done by smooth-wheel tandem rollers.

Quantities and Personnel

The major items included in this 10.5-mile grading and paving contract are as follows:

Unclassified excavation	503,987 cu. yds.
Subgrade-treatment material	66,357 cu. yds.
Channel excavation	1,000 cu. yds.
Excavation for structures	3,159 cu. yds.
Corrugated-metal pipe, 15 to 42-inch	5,837 lin. ft.
Concrete for structures	1,345 cu. yds.
Bar reinforcing steel	123,541 lbs.
Soil-bound macadam base course	157,371 sq. yds.
Tar prime	55,079 gals.
Hot binder course	11,323 tons
Modified Topeka pavement	7,548 tons

For the Brooks Construction Co., Inc., C. F. Myers is Superintendent and R. F. Hudson is Foreman on the grading op-

erations.

W. H. McWhorter is Resident Engineer on the project for the State Highway Department of Georgia. The Department is headed by J. C. Beasley, Director, with W. R. Neel, Deputy Director and Chief Engineer. Sam P. Allison is Construction Engineer.

Vapor Steam Cleaner

High-pressure steam-cleaning equipment for construction and automotive machinery is manufactured by D. C. Cooper Co., 1467 S. Michigan Ave., Chicago 5, Ill. The Cooper automatic vapor steam cleaner is portable or stationary and can be operated from any source of 110-volt ac; dc or other-voltage motors can be supplied on request.

The Cooper cleaner burns No. 1 fuel oil, kerosene, or light oil. Model MO46B develops 100 pounds of pressure within one minute, Cooper points out; is equipped with single-jet forced draft automatic ignition burners; and has a capacity of 100 gph. It is provided with 25 feet of oil-resistant steam hose and a balanced steam gun. Its weight is 550 pounds, and overall measurements are 19 x 48 x 48 inches.

Further information may be secured from the company, or by using the Request Card at page 16. Circle No. 115.

Admixture for Concrete

A liquid admixture for use in concrete is described in a folder prepared by the Building Products Division of L. Sonneborn Sons, Inc., 88 Eighth Ave., New York 11, N. Y. The Trimix compound is said to improve workability, accelerate time of set, improve the quality of the finished concrete, and act as an anti-freeze for winter concreting.

The catalog describes the various tests which have been conducted on concrete containing Trimix and indicates the significance of each of them. It points out that Trimix makes concreting easier, saves time and money, makes concrete structures stronger and longer-lasting, etc. A page of Bulletin BP-3017 also tells how to use Trimix and how much of it to add for various types of construction.

This literature may be obtained from the company. Or use the Request Card at page 16. Circle No. 85.



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A chair especially designed for draftsmen is announced by Cramer Posture Chair Co., Inc., 1205 Charlotte St., Kansas City 6, Mo. A feature of the chair is that it permits a maximum number of adjustments in order to assure a "tailor-made" support. The height of the seat can be adjusted from 23½ to 32½ inches, and its depth can be adjusted by means of a hand-wheel to accommodate individuals of any proportions. A similar adjustment is provided for the height of the back. The footrest is independently adjustable.

The seat has a forward-tilting mechanism which can be adjusted for the degree of tilt desired and for the weight of the user. As the draftsman leans forward to work on the upper part of his drawing, the seat follows his motions and provides adequate posture support. The legs are designed with a wide spread so that casters can be used without danger of the chair overturning.

Further information may be secured from the company, or by using the Request Card at page 16. Circle No. 89.

Stuart Is Named by Hyster

Alfred I. Stuart is now head of the Methods Engineering Department of the Hyster Co. He will assume full charge of methods engineering at the Hyster plants in Portland, Oreg.; Danville, Ill.; and Peoria, Ill.

Chain Belt Agent in East

William A. Clayton is the new Eastern Sales Representative for the Construction Machinery Division, Chain Belt Co., of Milwaukee, Wis. He will make his headquarters in the company office at 19 Rector St. in New York City.

Truck-Towed Spreader Unit

A spreader for bituminous concrete and aggregate is described in a 4-page folder available from The Miller Spreader Corp., 120 Pike St., Youngstown 2, Ohio. The folder explains that the spreader spreads a level course regardless of base contour, spreads to a thickness of from ½ inch to 8 inches, and has a capacity of a ton a minute. Pictures show how the screed moves



This heavy plow, pulled by an Allis-Chalmers tractor, is exploring and digging trenches for the coaxial cable which Pacific Telephone & Telegraph Co. is laying underground between Yakima and Seattle, Wash. The cable is part of a trans-continental system which has already been brought as far west as St. Louis and eventually will link the entire country.


forward on a level plane and how the Miller spreader can be used on a variety of spreading jobs; they also illustrate the features of the bolt-on hitch. Specifications are provided on the construction of the spreader, the available widths, wheels, cut-off plates, weight,

etc. The folder also tells how to hitch the spreader properly to any conventional dump truck.

This literature may be obtained from the company. Or use the Request Card which will be found at page 16. Circle No. 83.

7

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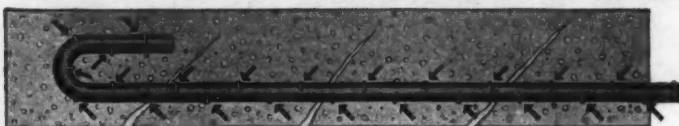
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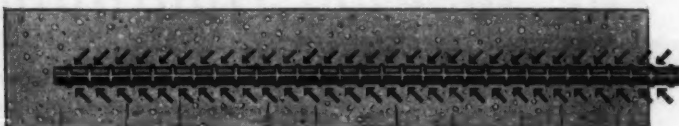
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St. Louis, Mo.

Distributor Doings

Distributors for Osgood, General

The Osgood Co. and The General Excavator Co., Marion, Ohio, have announced the appointment of new distributors for their power shovels and material-handling equipment. Contractor's Service, Inc., 317 W. Worthington Ave., Charlotte, N. C., will cover the entire state of South Carolina. Dulaney Service Co., R. R. 1, Box 96, San Antonio 4, Texas, will cover southern Texas. And The Manning Equipment Co., 17560 Chicago Ave., Lansing, Ill., will cover the northern half of Indiana, with the exception of Lake, LaPorte, and Porter Counties.

Handles Bucyrus-Erie in Calif.

Merrill-Brose Co., San Francisco, has been appointed a distributor for the Bucyrus-Erie Co. The Merrill-Brose territory covers the northern portion of California and is bounded on the south by Monterey and Fresno Counties. From its headquarters at 11th and Howard Sts., the company will handle the B-E $\frac{3}{4}$ to $2\frac{1}{2}$ -yard shovels, cranes, and draglines, and the all-hydraulic Hydrocrane unit. Southern California contractors will continue to be served by the Crook Co. of Los Angeles.

Expansion Completed by Shaw

The Shaw Equipment Co. announces that it has completed its expansion program and that Russell Smith has been appointed to the position of Vice President in addition to his duties as General Manager. The Board of Directors has

doubled the capital structure of the company which now does an annual business of more than \$3,000,000. The company's motto is "Big Enough to Serve You—Small Enough to Know You". It maintains a complete parts and service department in Dallas, Texas, at 2510 S. Lamar St.

Lines handled by Shaw include those of Allis-Chalmers Mfg. Co., Baker Mfg. Co., Bethlehem Steel Co., Electric Taper & Equipment Co., Gar Wood Industries, Inc., H. & L. Mfg. Co., Hamilton Rubber Co., Hendrix Mfg. Co., Pacific Car & Foundry Co., Ransome Machinery Co., Shunk Mfg. Co., Thew Shovel Co., Tracto-Motive Corp., Wellman Engineering Co., and Worthington Pump & Machinery Corp.

Diamond Chain Appoints Dealers

Nine dealers have been appointed by the Diamond Chain Co. of Indianapolis. They are: Century Supply & Equipment Co., Akron, Ohio; Hines Bearing & Industrial Supply, Billings, Mont.; The Ross-Willoughby Co., Columbus, Ohio; Ralph Shawaker Co., Toledo, Ohio; Joseph E. Loughhead Co., Kalamazoo, Mich.; J. W. Vaughan Co., Greenville, S. C.; Crossley Co., Erie, Pa.; The Mine & Smelter Supply Co., El Paso, Texas; and The Harry Cornelius Co., Albuquerque, N. Mex.

Lamp of Dravo-Doyle Co. Dies

Oscar Lamp, Assistant Manager of the Dravo-Doyle Co., died recently at the age of 44. He had been with the company since 1937.



Rish Equipment Co. officials make plans for open-house festivities at their new Clarksburg, West Virginia, plant. Seated, left to right, Clarksburg Manager John Mullen, Assistant General Manager Phil Stanton, Clarksburg Assistant Manager Al Frendenburg. Standing are General Service Supervisor James B. Supler and General Parts Supervisor Samuel J. Hyams. The new plant is located on U. S. 50.

Rish Equipment Co., Opens Its Third Plant in Three Years

An open-house party to celebrate the opening of a new plant at Clarksburg,

W. Va., was held on April 2 by the Rish Equipment Co. Festivities included a dinner one evening in honor of the hundred or more manufacturers represented. (Concluded on next page)

A NEW UTILITY BODY FOR THE NATION'S BIG HIGHWAY PROGRAM The Low-Cost Dumpcrete



PAVING



BRIDGES



CURB AND GUTTER



WIDENING



MEDIAN STRIPS



SAND, GRAVEL, EARTH

If you handle a variety of paving jobs—Here's a proved way to get more yardage at less cost. Set up a central mixer (a paver or portable mixer) for close control of your mix. Then haul in the fast, low-cost Dumpcrete and place uniform loads.

If you handle big paving jobs—The low-cost Dumpcrete can pick up from your paver for off-the-slab pours . . . culverts, bridges, turn-outs, sidewalks, curb-and-gutters.

About the Dumpcrete—It's a non-agitating concrete body designed especially to haul air-entrained concrete (a must for extra durability and workability). The Dumpcrete costs less to buy, to run and to maintain. It loads fast and places fast. Learn how it can cut your costs. Mail the coupon today. There's no obligation.



The lower cost Dumpcrete is lightweight, watertight, with 13-foot chute, controlled higher discharge and lower center of gravity. Hauls sand, gravel, and soil too. Available in 2, 3, and 4 yard sizes.

Send me facts about the cost-cutting Dumpcrete for paving work.

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DUMP-crete
DIVISION, MAXON CONSTRUCTION CO., INC.
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THE CONCRETE VIBRATOR WITH THE 50 FT. REACH

A WHALE OF A TIME-SAVER ON THOSE HARD-TO-GET-AT JOBS, AND GENERAL CONSTRUCTION, TOO!

The Jackson Hydraulic

The 50' hose length makes frequent changes of location unnecessary, keeps the machine working, greatly reduces non-productive time. Interchangeable fittings permit reversing the hose whenever wear makes it desirable. No troublesome parts to break. All parts run in oil. No lubrication problem. Husky Wisconsin engine. Frequency instantly adjustable from 4,000 to 7,000 VPM.

BUY OR RENT this unexcelled vibrator from your nearest Jackson Distributor

ELECTRIC TAMPER & EQUIPMENT COMPANY • Ludington, Mich.

Distributor Doings

(Continued from preceding page)

resented by Rish; and on the following evening a cocktail party, buffet supper, and professional entertainment for customers and other guests.

Rish formerly occupied rented property in Clarksburg. The new Clarksburg plant is the third built by the company in three years. It is located on U. S. 50 outside of Clarksburg, near the little town of Bridgeport, and it will serve the 31 counties in northern West Virginia and western Maryland. The plant is 120 x 200 feet in area and includes space for a modern shop with all new equipment, a large two-tier parts department, spacious showrooms, diesel-testing laboratory, offices, and a recreation room for employees. The 12-acre tract of land on which it is situated provides for a large parking area, a hillside proving ground for the equipment Rish services and sells, and a big lot for open storage of used equipment. The plant is of Jetcreted concrete-block construction, and is completely air-conditioned.

General offices for Rish are in Bluefield, W. Va. Other Rish plants are at Charleston, W. Va.; Roanoke, Va.; Cincinnati, Ohio; and Richmond, Va. The Richmond plant was opened in 1946; the Cincinnati one in 1947. Lon M. Rish is President; H. D. Anderson is Vice President and General Manager; Phil Stanton is Assistant General Manager in charge of operations at Clarksburg, Cincinnati, and Charleston; James B. Supler is General Service Supervisor; and Samuel J. Hyams is General Parts Supervisor.

Name Change Made by Utica Dealer

A change in its organizational name is announced by Credle Equipment, Inc. The company is now called Credle-Nolan Equipment, Inc. Offices are located at 309 N. Genesee St., Utica 4, N. Y. Lines handled include P&H excavators and cranes, LaPlant-Choate motor scrapers and scraper wagons, and Huber rollers and maintainers.

Distributors Contacted by Air

A 10,000-mile flying sales trip has been completed by four sales executives of R. G. LeTourneau, Inc., Peoria, Ill. The trip included visits to 48 distributors in cities in the United States and Canada—Indianapolis, Ind.; Birmingham, Ala.; Charleston, W. Va.; Jacksonville, Fla.; New York and Rochester, N. Y.; Ottawa, Ont.; Cleveland, Ohio; Minneapolis, Minn.; Regina, Saskatchewan; Portland, Oreg.; Oakland, Calif.; Salt Lake City, Utah; El Paso and Dallas, Texas; Omaha, Nebr.; and St. Louis, Mo. The trip took 42 hours and 40 minutes of flying time and ran from February 28 to March 31.

Purpose of the trip was to bring LeTourneau distributors in the area the latest information on high-speed rubber-tired electric-control construction



On a 10,000-mile "flying sales trip" to visit distributors in the U. S. and Canada—LeTourneau sales executives (left to right) R. P. Nichols, H. R. McQuarrie, E. E. Weyeneth and D. K. Heiple.

tools, including two new models of Tournapulls and new-model Tournarockers and Tournahoppers. Those

making the trip were the four LeTourneau department heads—R. P. Nichols, Sales; D. K. Heiple, Field En-

gineering; E. E. Weyeneth, Advertising; and H. R. McQuarrie, Product Development. The trip was made in the company-owned twin-engined 14-passenger Lockheed Lodestar.

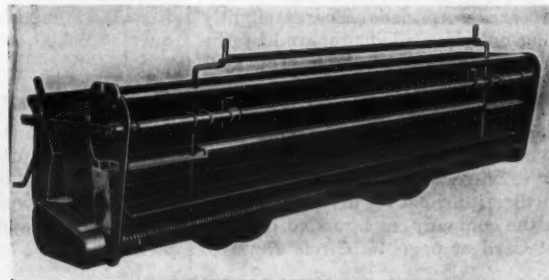
Distributor for Hyster in Kansas

Machinery & Supplies Co., Inc., Kansas City, Mo., is a new distributor for Hyster lift trucks, straddle trucks, and mobile cranes. The firm will handle Hyster sales and service in 60 counties of western Missouri, 31 counties of northern Oklahoma, and all of Kansas. George W. Gagel is President and Sales Manager of the company, which carries general industrial supplies and new and used contractors' equipment in addition to the Hyster line.

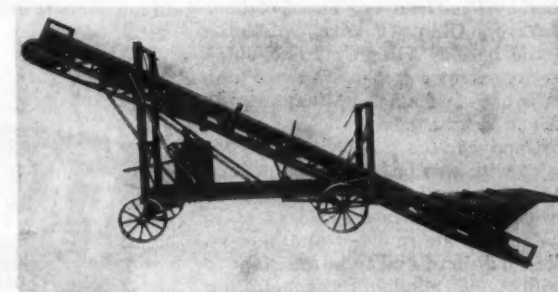
Dealers—this is your department, so send us your news—new plants, new lines, new staff appointments.



TILT-LIV BLADE—with auxiliary blade—both hydraulic controlled. Unexcelled for building shoulders and general road and street maintenance.



FORCE FEED SPREADER—Noted for its dual feed control, its accuracy and close adjustment. Comes in four sizes.



CAR UNLOADER—For handling coal, slag, stone, etc. Adjustable height, 26' or 32' boom, 12 H.P. gas engine.

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More Dirt Moves Faster When
OWEN BUCKETS
swing over dump trucks

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Long popular, Owen design and construction characteristics make for consistent "ease of operation" with "A Mouthful at Every Bite" and a clean and rapid discharge.

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To _____

(New address)

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Firm _____

Position _____

Slides and Slipouts Averted by Drainage

Mass ground movements in cuts and fills are almost always caused by the pressure of subsurface water which reduces the stability of the soil. Such movements can often be stopped by the use of horizontal drainage holes bored at advantageous spots, according to the Hydrauger Corp., 681 Market St., San Francisco, Calif.

The Hydrauger earth-boring machine is especially adaptable to this type of work. It was originally developed for installing pipe lines and drainage systems under highways and paved streets, without any excavation. It is powered by compressed air, is one-man-operated, and is designed to produce bores up to 200 feet in length. On an average, the company reports, 50 feet of 4½-inch holes can be bored per hour of operation.

Ordinarily, 4-inch holes are bored and reamed at locations which have been predetermined. These slightly sloping holes are then prepared by the insertion of perforated liners. This system is inexpensive, says Hydrauger, since it eliminates the need for excavating drainage ditches and constructing concrete bulkheads, shoring, or other arrangements.

Further information may be secured from the company, or by using the Request Card at page 16. Circle No. 116.

Road-Marking Paint Has a Rubber Base

A highway-marking paint with a base of synthetic-rubber resin has been described by The Goodyear Tire & Rubber Co., Akron, Ohio. Known as Pliolite S-5, the base is a high styrene-butadiene copolymer resin. Because the resin is non-oxidizing, it eliminates the tendency of the paint to skin or set, says Goodyear.

Paint with this base is recommended by the company for use on all types of improved road surfaces. It is said to withstand a wide range of weather and traffic conditions, and to be resistant to moisture and alkalis. Its penetration through dirt and grime, combined with its ability to bite and anchor, results in a tough long-wearing film, Goodyear points out.

Further information may be secured from the company, or by using the Request Card at page 16. Circle No. 101.

New Oil Filter

A transmission-oil filter is announced by the Fuller Mfg. Co., Transmission Division, Kalamazoo 13F, Mich. It is designed to keep gear oil constantly free of grit, grime, and abrasives. For use on the Fuller transmission, it fits most other makes as well, Fuller points out.

The unit consists of a stamped housing with a replaceable filter element. As the transmission gears rotate, the oil is forced, under pressure, into the housing and through the filter element. Foreign matter suspended in the oil and circulating with it is deposited on the filter element and in the sump at the bottom of the housing. Clean oil is then channeled back into the transmission case.

The Fuller oil filter is designed for mounting on all transmissions equipped with standard SAE power take-off openings of the six-bolt short-length type. It is used where the countershaft gears adjacent to the opening are of sufficient diameter to build up the pressure required to force the oil through the filter assembly. The filter is held in place with the same cap screws used to attach the cover plate of the power take-off.

The Fuller engineers point out that the filter is not intended to lengthen the interval between oil changes. Its pri-



On the Southern Pacific Railroad lines near Sacramento, Calif., a Hydrauger earth-boring machine goes to work on horizontal drainage holes to avert embankment slides and slipouts caused by subsurface water. Perforated liners are inserted in the holes once they are bored. This procedure eliminates the need for drainage ditches, etc.

mary function is to insure clean oil between change periods, and correspondingly less wear of bearings, bushings, and other highly finished parts.

Further information may be secured from the company, or by using the Request Card at page 16. Circle No. 91.

Truck-Mounted Loader Unit

A truck-mounted front-end loader is described in a new 4-page folder. The Dozer Loader is one-man-operated and hydraulically controlled. It has a ¾-yard capacity and is designed to complete a loading cycle in 20 seconds.

The folder contains a series of photographs of the unit during successive steps in a loading cycle—from picking up the material to dumping it in a truck body. It also lists 14 features claimed for the Dozer Loader, including fast operation, lift capacity of 2,000 pounds, all movements in full view of the driver,

lever control located in the truck cab, arms detached in approximately 5 minutes, and others.

Those desiring copies of this literature should write to J. C. Plummer Co., 224 N. Beachwood Drive, Los Angeles 4, Calif. Or use the Request Card at page 16. Circle No. 98.

Plant No. 2 for Eutectic

New production facilities have been established by the Eutectic Welding Alloys Corp. Plant No. 2, located in Flushing, N. Y., occupies approximately 100,000 square feet and consists of a foundry, metal rolling and drawing plant, several large extrusion presses for producing coated electrodes, and alloy-cutting facilities. It will also con-

tain a complete gas-welding division plus special control and research laboratories.

FASTER LAND CLEARING

means **LOWER** bids

In wooded country, you can save days with McCulloch Chain Saws

- * Weighs only 49 lbs. complete with 20-inch blade and chain
- * 6 models (20 to 60 inches) for trees to 5 feet in diameter
- * Full 5 hp...Special Rip-Cross chain is easily sharpened without special tools
- * Price...only **\$385.00** (f.o.b. Los Angeles (20 inch model))

Give yourself a competitive advantage by using fast-cutting McCulloch chain saws to fell, buck, or rip any kind of wood. You can use them in the roughest country—and they'll fell trees even the biggest dozer can't handle.

Don't miss a bet in figuring costs. Send now for information on McCulloch chain saws. We'll be glad to answer your questions on the use of chain saws for construction and land-clearing.

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An exclusive feature you will appreciate on MM Industrial Wheelers is shuttle gear performance to streamline loading and dozing operations.

Straight line reverse lever on shuttle gear eliminates slow shifting—the shuttle gear also provides 6 forward and 6 reverse speeds up to 14.5 m.p.h. for saving valuable time on every job.

Easiest handling for their capacity. MM Industrial Wheelers are quick and easy to maneuver.

Front wheels are inset over steering knuckle pins to eliminate road shock and binding under heavy front-end load... minimize operator fatigue.

To assure low investment on equipment, MM Industrial Wheelers have a wide selection of attachments and a choice of rear wheel equipment that adapt them to many jobs.

Complete facts on Industrial Wheeler application are available at your MM Dealer or from—

MINNEAPOLIS-MOLINE
POWER IMPLEMENT CO.
MINNEAPOLIS 1, MINNESOTA

Giant Expressways For Los Angeles Area

(Continued from page 6)

Angeles metropolitan area. Active construction is under way on Arroyo Seco Parkway, Hollywood Parkway, Harbor Parkway, and Santa Ana Parkway.

Much also has been accomplished on the Ridge Route running north of San Fernando Valley to the Kern County line. The Ridge Route, the main connecting highway between the great Central Valley of California and southern California, is not generally regarded as a part of the metropolitan Los Angeles freeway system. However, it is a most important arterial highway, and for a considerable portion of its length it operates in effect as a freeway. It performs an important transportation function for the Los Angeles area.

Of the freeways in the Los Angeles metropolitan system, the Arroyo Seco Parkway was the first to be established and built by the State.

Arroyo Seco Parkway

During the past 18 months, since the Collier-Burns Highway Act of 1947 went into effect, much has been accomplished in extension of the Arroyo Seco Parkway southerly towards Los Angeles Civic Center to a connection with Harbor Parkway. The northerly portion of the Arroyo Seco Parkway between Avenue 22 in Los Angeles and Glenarm Street in Pasadena was completed and opened to traffic in December, 1940. Since that time and to a limited extent during the war years, development of this parkway has been extended southerly across the Los Angeles River through Elysian Park to College Street, including construction of storm drains, roadway widening through the four tunnels, and additional grading and paving so the section between Riverside Drive and College Street could function as a full freeway.

What has been accomplished is shown by the fact that a recent traffic count indicated a 24-hour traffic of 86,127 vehicles, with 9,550 vehicles during the peak flow hour.

Now in progress on Arroyo Seco Parkway between College Street and Sunset Boulevard is a contract for a grade-separation structure at Alpine Street, where a single bridge serves the dual purpose of passing Alpine Street traffic and North Figueroa Terrace

traffic over the parkway.

The Sunset Boulevard grade separation was also completed during the last year, costing \$550,000. It will carry the Arroyo Seco Parkway under Sunset Boulevard. This grade-separation structure is only a short distance north of the unique grade-separation and interchange structure reported in the companion article.

Four-Level Grade Separation

Generally speaking, the grade separation occupies a spot of key importance in the freeway system. Costing about \$1,500,000, it will be completed in late spring or midsummer of 1949. It will not be usable until the connecting roadways have been finished. That will take approximately another year.

The four-level grade-separation structure is at the intersection of Arroyo Seco Parkway, Harbor Parkway, and Hollywood Parkway, near Sunset Boulevard and Figueroa Street which is the heaviest-traveled intersection in the Los Angeles metropolitan area. It provides for a full interchange of traffic between these parkways. The structure and interchange is the first one of its kind to be built anywhere.

It represents a new method of handling traffic interchange between major highway arterials, and is a design greatly simplified and less expensive to build than conventional types of cloverleaf interchange systems. A cloverleaf design could not carry the very heavy traffic at this interchange, and it has certain inherent objectionable features. In the cloverleaf type the left turn is accomplished by means of a 270-degree loop to the right. In the cloverleaf there is also an overlap in movements of accelerating and decelerating traffic with resulting conflict and confusion.

The four-level grade-separation structure eliminates all objectionable features by providing simple turns for all traffic movements in the direction in which traffic goes. Another advantage is that take-offs for automobiles from the freeway and entrances to the freeway are all made on the right side of the roadways.

Arrangement of the four-level structure is such that four separate roadway levels pass or cross one another in a single bridge structure. This results in economy of construction costs. In order to function as a freeway traffic interchange system, the four-level structure requires in close vicinity what

might be called 12 "satellite" bridges. Within the total project, extending from Grand Avenue to Beaudry Avenue and from Sunset Boulevard to Temple Street, total cost of construction represents \$5,000,000, completed and in progress. It is interesting to note that right-of-way costs to clear 212 dwell-

ings in the area totaled in excess of \$2,000,000.

Grade separations as elaborate as this structure now under construction are justified only where large volumes of traffic must be provided with easy interchange.

(Continued on next page)

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RICE self-priming centrifugal pumps embody proven developments in pump design... features that set high standards in centrifugal pump performance:

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- **DIRECT LINE FLOW** — liquid flows through suction opening to impeller in direct line. Large openings, no sharp turns, minimum friction.
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- **SELF-LUBRICATED SHAFT SEAL** — Biggest improvement in pump seals in a decade. Entire seal enclosed in welded, pressed steel cartridge. Quickly and easily replaced.
- **NON-CLOGGING IMPELLER and WEAR-PLATE** — Rice Pump impellers are of the open type; handle liquids with a high percentage of solids. Hardened steel wear-plate and impeller replaceable when worn.

Write for New Illustrated Bulletin on 2", 7M and 10M models, the two most popular sizes of centrifugal pumps for the construction and oil field industries.

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**GATKE Type 300
Clutch Discs**
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LARGE OR SMALL

Whatever the Service

GATKE BRAKE LININGS and CLUTCH FACINGS offer extra performance value that gets the job done — **FASTER** — and also effects important savings. Try them and see what you've been missing.

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Just send dimensional prints and description of service condition for the Gatke recommendation.

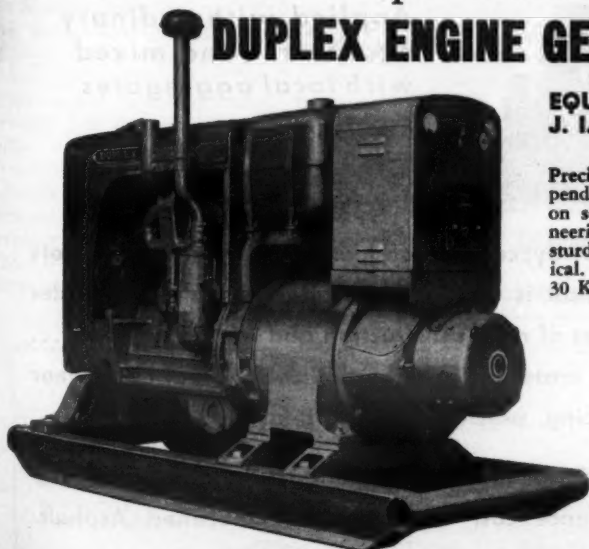
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TRUCK COMPANY
LANSING, MICH.

Giant Expressways For Los Angeles Area

(Continued from preceding page)

Hollywood Parkway

Hollywood Parkway is without question the most important freeway in the metropolitan Los Angeles freeway system. It extends from Spring Street in the Los Angeles civic center northerly to Vineland Avenue in the San Fernando Valley. The 2-mile unit from Highland Avenue to Barham Boulevard, then known as Cahuenga Freeway, was completed in 1939 under a Los Angeles city contract financed with city, Federal, and state highway funds. Further construction on this important freeway was delayed until additional state financing could be provided by the Collier-Burns Highway Act.

With additional money available, much construction has been put under state contract on the Hollywood Parkway. The completed and practically completed construction includes grade-separation structures at Grand Avenue, Benton Way, Silver Lake Boulevard, Alvarado Street, Rosemont Avenue, Hoover Street, and Virgil Avenue. It represents an expenditure of approximately \$2,000,000. Grade-separation construction in progress, for which bids have recently been received, in addition to the four-level structure mentioned previously, includes bridges at 15 other locations.

These grade-separation bridges are located at Los Angeles Street, Spring Street, Broadway, Figueroa Street, Beaudry Avenue, Glendale Boulevard, Bonnie Brae Street, Coronado Street, Vendome Street, Vermont Avenue, Heliotrope Drive, Melrose Avenue, Normandie Avenue, Western Avenue, and Santa Monica Boulevard. These grade-separation operations now under way on Hollywood Parkway total \$6,000,000.

It is necessary that grade-separation structures be built in advance of roadway grading and paving, but it is expected that a grading and paving contract to connect the grade separations and complete the Hollywood Parkway between Grand Avenue and Western Avenue will be advertised early this spring. It is hoped that this 5-mile length of the Hollywood Parkway will be finished and opened to traffic during 1950. From Western Avenue northerly to a junction with the completed portion of the Hollywood Parkway through Cahuenga Pass, additional construction

contracts will be advertised as soon as right-of-ways can be secured, details of design completed, and financing provided.

Another important unit of Hollywood Parkway is located at the north end between Barham Boulevard and Vineland Avenue. This 2-mile section, costing approximately \$2,000,000, was recently opened to traffic.

Construction of the Hollywood Parkway posed some interesting problems, not the least of which was the effect it might have on the acoustics of Hollywood Bowl. Anxious to see that traffic noises and the like did not interfere with the magnificent acoustics of the Bowl, where outdoor concerts, musical programs, and other gatherings are held, the Los Angeles City Engineer's office and the State Highway Department got acoustical experts from the top of the list. The California Institute of Technology cooperated. Out of all the deliberations came construction designs which will not impair the programs at Hollywood Bowl.

Another question which has arisen during the past 18 months is that of rail rapid transit. This feature could not have been incorporated in the Hollywood Parkway design without causing a 5-year delay. Such long delay could not be tolerated; therefore the proposal to incorporate rail transit in that portion of the Hollywood Parkway between Vermont Avenue and Highland Avenue had to be abandoned. Cooperative steps have been taken by the State and City so that later construction of rail rapid transit to Hollywood and San Fernando Valley will not be blocked.

At the southerly terminus of the Hollywood Parkway in the Los Angeles Civic center at Spring Street is the connection with the Santa Ana Parkway.

Santa Ana Parkway

Santa Ana Parkway southeasterly from Los Angeles to Santa Ana is in effect a continuation of the Hollywood Parkway. A 2-mile section of the Santa Ana Parkway between Aliso Street Viaduct and Soto Street was completed recently and opened to traffic. The Aliso Street viaduct project, which is the junction between Santa Ana Parkway and Ramona Freeway, was completed in 1941 under a Los Angeles city contract with cooperative financing by city, state, and Federal governments, and the four railroads involved.

Eight grade-separation structures have been completed on the Santa Ana Parkway between Soto Street and

Eastman Avenue, just beyond the Los Angeles city limits. A grading and paving contract is now under way to join up these completed grade-separation structures, and it is anticipated that by this spring another 2-mile unit of the Santa Ana Parkway will have been opened to traffic.

Work also is well under way on the \$1,500,000 construction contract for the portion of the Santa Ana Parkway between La Verne and Eastland Avenues. Within the limits of this 1/2-mile section, a new grade-separation structure under the tracks of the Union Pacific Railroad and another under Atlantic Boulevard are being built. The existing subway to the east, which now carries Atlantic

Boulevard and Anaheim-Telegraph Road traffic under Union Pacific tracks, is left undisturbed for local traffic.

The new grade-separation structures at this location will be opened to traffic in approximately one year, and the bad traffic bottleneck at the existing subway will be a thing of the past.

Exclusive of Aliso Street grade-separation project, with the viaduct over the Los Angeles River, current and completed construction on the Santa Ana Parkway totals about \$6,000,000.

Harbor Parkway

In the same sense in which the Santa (Concluded on next page)

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Plants: Cincinnati, O. • St. Louis, Mo. • El Dorado, Ark. • Buffalo, N.Y.

PUMP RIDES AIRBORNE... TO EACH LOCATION!



ANOTHER EXAMPLE
OF COMPACT,
DEPENDABLE...

WISCONSIN HEAVY DUTY Air-Cooled ENGINE Serviceability

Whether riding airborne by helicopter... or "washing down" special shot-hole casings 90 ft. deep while engaged in geophysical exploration work... or handling any of a great variety of engine power field operations in construction service, Wisconsin Air-Cooled Engines pay off handsomely in terms of easy portability and heavy-duty dependability. Combining compact design, light weight, and heavy-duty construction with plenty of reserve horsepower for the hard pulls, plus trouble-free AIR-COOLING... Wisconsin Engines meet the varying demands of climatic and work conditions. Weather-sealed rotary type high tension OUTSIDE magneto, equipped with impulse coupling assures easy starting and sure-firing. Tapered roller bearings at BOTH ends of the crankshaft provide maximum protection against bearing failure.

Supplied in 4-cycle single cylinder, 2-cylinder and V-type 4-cylinder types, in a full power range, 2 to 30 hp.

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H.P. HOURS

WISCONSIN MOTOR CORPORATION

World's Largest Builders of Heavy-Duty Air-Cooled Engines

MILWAUKEE 14 WISCONSIN

Ana Parkway is a southeasterly extension of Hollywood Parkway, the Harbor Parkway is a southerly extension of Arroyo Seco Parkway.

Harbor Parkway begins at the four-level grade separation and will extend southerly to San Pedro. The portion of the Harbor Parkway that has been definitely located extends from the four-level structure just north of Temple Street to Olympic Boulevard.

For this section, the City and State have entered into a freeway agreement which determines special features of design and treatment that shall be given city streets affected by the proposed construction. A part of the general plan is that not only Fifth and Sixth Streets shall operate as one-way streets, but Third, Fourth, Eighth, and Ninth Streets also. This proposal contemplates construction of a new tunnel for Fourth Street to connect existing discontinuous portions of this street.

On this portion of the Harbor Parkway, right-of-way is being acquired by the State. Many buildings are being removed to clear the right-of-way. Moving of buildings from all state highway right-of-way to clear the path for construction is being carried out with as little hardship as possible on tenants occupying the houses. Measures have been taken to assist families whose living quarters have to be moved or demolished.

Construction was completed recently on the grade-separation project to take Temple Street over the Harbor Parkway. This involved construction of three bridges, one for the main freeway and two for interchange roadways. Cost of this grade separation is about \$400,000.

On the portion of the Harbor Parkway southerly of Olympic Boulevard to San Pedro only preliminary studies have been made. No definite statements can be made as to precisely where the freeway will be located.

The Ridge Route

The Ridge Route, U. S. 99, is important because it is a direct highway connection between Los Angeles and the San Joaquin and Sacramento Valleys. Of the seven metropolitan districts of the state, Los Angeles, Fresno, Stockton, and Sacramento are served by this route. In addition to its extensive use for interstate travel, its transportation facilities serve agriculture, industry, recreation, mining, forestry, and commerce, and make city living possible. The Division of Highways is committed to a program of making the Ridge Route a four-lane divided limited-access highway throughout its entire length. Much has already been accomplished to that end, particularly in Los Angeles County.

A construction contract for alignment improvement and widening, totaling \$900,000 and covering a length of 2.2 miles between Palomas Creek and Violin Saddle, has been completed. The 3.8-mile section between Whitaker Summit and Piru Creek was recently reconstructed at a cost of \$1,600,000. The 2.6-mile section from Santa Clara River to Castiac Creek, now being re-

constructed and widened at a cost of \$500,000, will be completed this spring.

Reconstruction and widening work on the Ridge Route is in progress on three other sections having a total mileage of 14.5 and involving a total expenditure of \$3,500,000.

A breakdown of construction contracts for 1948 reflects quite accurately the magnitude of the job under way. It shows a total of \$16,928,300 directly charged to freeways. A total of \$7,985,700 is being expended for construction of limited-access highways. Divided highways account for \$2,106,700. Thus \$27,020,700 is being spent for 4-lane divided-highway construction. Only \$4,018,300 is being spent on Federal-Aid secondary routes and on grading, paving, surfacing, landscaping, and signals on minor highways, so acute has the problem of mass transportation become in Los Angeles and its neighboring cities.

Personnel

Much of the freeway construction is within the city of Los Angeles, whose engineering and administrative officials as well as those of the county have co-operated closely with the State Division of Highways in coordinating the work.

State highway construction is administered by the Department of Public Works, Division of Highways. C. H. Purcell is State Director of Public Works, with George T. McCoy as State Highway Engineer with offices at Sacramento. Harrison R. Baker of Pasadena is the State Highway Commissioner for the Los Angeles District. Work in Los Angeles, Orange, and Ventura Counties, known as District VII, is under the general supervision of

470 FOURTH AVENUE

New York 16, N. Y.

is Information
Headquarters

for contractors, highway officials and distributors wanting further details or printed matter from the manufacturers advertising in these pages. Our Reader Service Department will be glad to forward any literature or special requests you mail to us at the above address.

**CONTRACTORS AND
ENGINEERS
MONTHLY**

S. V. Cortelyou, Assistant State Highway Engineer and co-writer of this article. His headquarters office is in Los Angeles.

Hoist Has 30:1 Ratio

A portable hoist which weighs 8½ pounds and can lift 1½ tons is announced by the Lincoln Precision Machining Co., North Grafton, Mass. As a special feature of the Lug-All hoist, it can be taken apart, repaired, and re-assembled using only a screw driver and wrench.

The Lug-All hoist is equipped with a 133-strand aircraft cable designed to reel out easily without snagging. Limit for the cable is 15 feet, at which length it has a hoist capacity of 1,500 pounds. With the cable doubled, the Lug-All's capacity is increased to 3,000 pounds. It is equipped also with a 20-inch-long reversible handle.

Further information may be secured



A 1½-ton load can be handled by the new Lug-All hoist. Its 20-inch-long handle is reversible.

from the company, or by using the Request Card at page 16. Circle No. 78.

STATE HIGHWAYS

Choose

EAGLE LOADERS

3 TO 5 YDS.
PER MINUTE

ONE MAN
OPERATED
JOB TO JOB AT
TRUCK SPEEDS

• Hard at work on the thousands of miles of state highways, these Eagle loaders are speeding up the handling of windrow dirt, loading from stock piles, snow removal (in season), etc. Eagles can load more—faster!



WRITE FOR DETAILED SPECIFICATIONS—DEPT. CE-59

EAGLE
JAW CRUSHERS • IMPACT BREAKERS
PULVERIZERS • CONVEYORS • LOADERS
CRUSHER CO., Inc. GALION, OHIO-U.S.A.

BE SURE YOUR NEXT TRAILER HAS ALL THESE FEATURES

• Deep, wide flange main beams running the full length of the trailer, I-Beam sections for cross-members and outriggers, improved, fabricated gooseneck, and all electric-welded construction. Look at all the other features found only on Jahn tandem axles: (1) constant lift cam, (2) two full-width axles attached to longitudinal rocker beams, (3) worm gear type slack adjusters at each wheel, (4) heavy coil springs at each axle and (5) positive equalizing braking at each wheel regardless of position of axle.

C. R. JAHN COMPANY

1106 W. 35th ST. Dept. 47 CHICAGO 3, ILL.

Heavy duty trailers from 5 to 100 tons.



NEW 24" AIR SAW with WARREN HIGH SPEED CHAIN

Makes amazing speed in clearing, topping piles, or underwater cutting. Weighs only 46 lbs. In use from coast to coast by leading contractors and railroads. Local demonstrations arranged.

Also One and Two Man Gas Saws with famous Warren High Speed Chain.



LOMBARD
GOVERNOR CORP. Ashland, Mass.



Top figure, a Morris gasket-sealed coupling slides on over plain-end or threaded pipe. Below, the repair clamp is tightened with a wrench.

Flexible-Steel Clamp For Repairing Pipes

A flexible-steel band clamp for covering leaks in pipe lines is announced by the Morris Coupling & Clamp Co., 12th St. and Factory Ave., Ellwood City, Pa. These clamps are especially recommended by the company for emergency repairs, and are designed to stop leakage from large and small holes, splits, cracks, and pitted corrosion areas.

As an exclusive feature of the Morris clamp, the inner sleeve can be turned around inside the clamp shell to position the clamp for easy tightening regardless of the location of the leak. Long cracks or splits are covered by butting several clamps together. The inner sleeves are placed end to end over a long gasket cut to cover the leak, and the outer shells are applied so as to cover the sleeve butts.

Leaking sections of pipe which are past repair can be replaced with a new length of pipe jointed by slipping two compression-type gasket-sealed pipe couplings over the pipe ends. This coupling is said to replace collars and unions, and may be used on either plain-end or threaded pipe. The couplings are available in standard iron-pipe sizes from 1/2 to 4 inches; the clamps, from 1/2 to 14 inches.

Further information may be secured

from the company. Or use the Request Card at page 16. Circle No. 45.

New Tires Announced

A tire designed for both off-the-road and on-the-highway use is announced by the B. F. Goodrich Co., Akron, Ohio. It makes possible easy steering, says the manufacturer, and it is valuable on front wheels of many trucks now carrying super-traction tires on their rear wheels. The company points out that the Rock-Logger tire has a casing especially adapted to dual-type service.

Also announced by Goodrich is an off-the-road tire which features Nylon cord throughout, including a Nylon shock shield. The Nylon cord is designed to increase tire strength; make the tire able to withstand a heavy impact without rupturing; and permit the recapping of a larger percentage of tires. The tires are made with the Goodrich webless construction in which there are no cross threads to increase friction. This construction reduces growth in service, says Goodrich, because the tension of the cord is controlled and equalized. The tires are available in the following sizes: 11:00 x 20 and 11:00 x 24 in 14-ply rating; 12:00 x 24 in 16-ply rating; 14:00 x 24, 16:00 x 24, 18:00 x 24, and 21:00 x 24 in 20-ply rating; and 16:00 x 24, 18:00 x 24, and 21:00 x 24 in 24-ply rating.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 80.

American Hoist Election

Stanley M. Hunter has been elected to the newly created position of Executive Vice President of the American Hoist & Derrick Co., St. Paul, Minn. Mr. Hunter joined the Sales Department of American Hoist in 1936 and has served as Vice President of Sales, and a member of the Board of Directors, since 1945.

Loader Has 4-Wheel Drive

Features of the 1 1/2-cubic-yard Model HM Payloader are pointed out in a catalog prepared by The Frank G. Hough Co., 801-F Sunnyside Ave., Libertyville, Ill. The Payloader is an integral tractor and front-end loader entirely Hough-built and designed for digging, loading, carrying, dumping, or bulldozing operations. The Model HM is powered by a 76-hp gasoline engine.

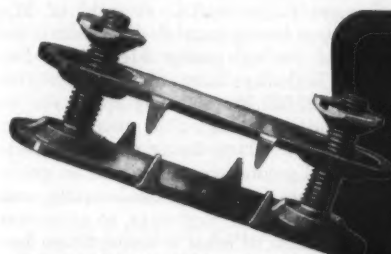
Bulletin No. 183 describes the Hough

unit's tip-back bucket, 4-wheel traction, hydraulic bucket control, high dumping and ground clearance, power steering, fully reversing transmission, crowding action, compact design, positive down pressure, and all-around performance.

Specifications listed in the bulletin are grouped according to overall meas-

urements, bucket, engine, wheels and tires, turning radius, clutch, travel speeds, weights, standard equipment, and accessories. Bulletin No. 183 also describes briefly other Payloader models.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 41.



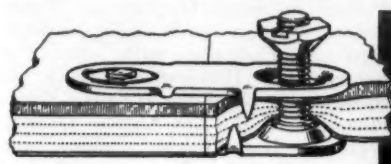
**FOR HEAVY CONVEYOR
AND ELEVATOR BELTS OF
ANY WIDTH**

Flexco HD Fasteners make a tight, butt joint of great strength and durability... distribute the strain uniformly. Operate smoothly over flat, crowned or take-up pulleys. Made of steel, Monel, Everdur and Promal.

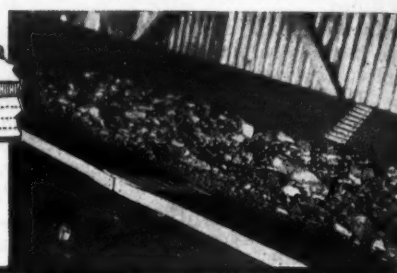
Flexco Rip Plates are for repairing and patching damaged belts.

Ask for Bulletin F-100

FLEXIBLE STEEL LACING COMPANY • 4608 Lexington St., Chicago 44, Illinois



**Strong, Smooth, Readily Troughing
Order From Your Supply House**



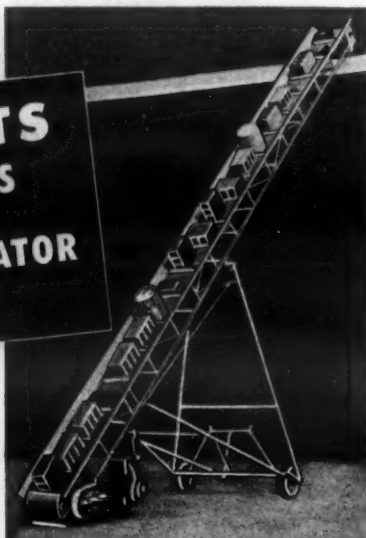
BUILDERS CONTRACTORS

**CUT COSTS
With MULKEY'S
All-Steel
PORTABLE ELEVATOR
It's Balanced**

★ For bricks, blocks, mortar in buckets, sand, roofing, lumber, boxes, dirt, sacks, etc.

★ One man can handle and operate...easily trailed up to 35 miles per hour.

★ Clutch and Brake Assembly own design (Extra)



Basic Length 24 ft. • 17 1/2 ft. Maximum Lift
8' and 14' Extensions Available
Also Available: 16' Elevator (Same Design)

Write for FREE Literature and Prices!

SAM MULKEY COMPANY
1621-KE Locust
Kansas City 8, Mo.

Learning
Your
Clutch
Needs

Analysing the
Problem

Designing the
Clutch

Planning
Production

Tooling Up

Manufacturing

Checking and
Testing

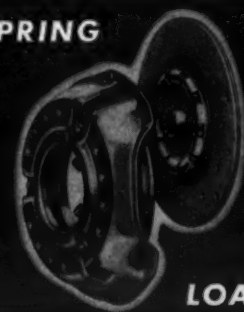
Supervising
Installation

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**ENGINEERED
To The Job**

SPRING



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ROCKFORD

CLUTCHES

A growing number of manufacturers depend on ROCKFORD for the solution of their CLUTCH problems because they appreciate our policy of working closely with their engineering departments in all phases of their power transmission and control developments. ROCKFORD cooperates with them to produce CLUTCHES and POWER TAKE-OFFS that fit their specific needs. ROCKFORD has the required CLUTCH experience, engineering skill and manufacturing facilities to make just the right application for each job. Send us a print showing your product's requirements for a ROCKFORD engineered to the job CLUTCH or POWER TAKE-OFF recommendation.

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Automotive
and Aircraft

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Road Machines

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and Implements

Oil Field
Rigs and Pumps

Industrial

Mowers
and Light
Machines

Engines and
Marine
Units

Machine Tools
Production Units

ROCKFORD
CLUTCHES
POWER
TAKE-OFFS

Convention Calendar

June 13-18—Western Highway Officials

Annual conference, Western Association of State Highway Officials, Cosmopolitan Hotel, Denver, Colo. D. N. Stewart, Superintendent of Maintenance, Colorado State Highway Department, Denver, Colo.

July 13-15—ASCE Meeting

Summer meeting, American Society of Civil Engineers, Hotel Del Prado, Mexico City, Mexico. D. P. Reynolds, Assistant to Secretary, 33 W. 39th St., New York 18, N. Y.

Sept. 25-Oct. 2—Construction Exposition

Construction Industries Exposition, Houston Chapter, Associated General Contractors of America, Inc., Sam Houston Coliseum, Houston, Texas. L. W. Duddleston, Executive Secretary, AGC Office Bldg., Gray and Crawford Sts., Houston, Texas.

October 10-14—AASHTO Meeting

Annual meeting, American Association of State Highway Officials, Gunter Hotel, San Antonio, Texas. Hal H. Hale, Executive Secretary, 1220 National Press Bldg., Washington 4, D. C.

Circular Wales Used On Large Cofferdam

A large circular cofferdam, entirely free of interior bracing, has been erected on the Mississippi River opposite St. Louis. Inside of it men are building a pump-well structure which is part of a circulating-water intake for an addition to the Union Electric Power Co. plant at Venice, Ill. Design and construction of the cofferdam were executed by Western Foundation Corp. working with Stone & Webster Engineering Corp., engineers on the project.

The cofferdam is 97 feet in diameter and is constructed with steel sheet piles. An unusual feature is the use of circular concrete wales in place of cross bracing. This construction permits unobstructed work inside the cofferdam, with thrust against the sheet piles taken by the circular wales in compression.

A large open area, free from interior bracing, was required to build the pump-well structure. Accordingly, two 4 x 4½-foot ring wales were placed at levels of 24 and 38 feet below the top of the cofferdam Z sheet piles. These wales act as continuous arches to prevent distortion. They hold back a head differential of as much as 50 feet. To install them, a partial excavation was made to the desired levels, and then they were formed and concreted in place.

Work space in the cofferdam was adequate to allow a hydraulic dredge floating inside to complete the excavation. Bulky drilling equipment, set in the unobstructed interior, was used to install Drilled-In caissons. A 30-inch

pipe was driven to the rock formation and a churn drill cut a 4-foot socket in the rock. A steel core was then put into place and the caisson concreted.

After placing a mat of reinforced tremie concrete, workmen unwatered the cofferdam. The pump-well structure is being formed and concreted without moving or boxing-out any bracing. When it is completed, the cofferdam will be backfilled with earth and the sheet piling pulled. The ring wales will be left in the ground.

All-Metal Buildings From Standard Units

Standardized sections for constructing light-frame steel buildings are made by The Steelcraft Mfg. Co., 9015 Blue Ash Road, Rossmoynne, Ohio. These buildings are adaptable to many types of service and can be built in any width or length by combining the various standardized sections.

The Steelcraft sections are made in spans of 16, 20, 32, 40, and 50 feet. Standardized sections and structural parts may be combined with any type of wall and roof covering to meet specific requirements. These buildings are erected as permanent structures, and can be modified or enlarged as conditions warrant. The side-wall and roof panels are made from ribbed aluminum alloy. All parts are precision pre-fitted and labeled for accuracy and ease in field assembly.

Further information may be secured from the company, or by using the Request Card at page 16. Circle No. 76.

SCAFFOLDS



INSTANT ERECTION ON THE JOB With Hullo Wedge Units

Every Joint Wedged in a Vise of Steel. No Skill or Tools Required. No Trimming or Fitting Necessary. 100% Salvage of Timbers Used. Safety Endorsed—Cannot Collapse.

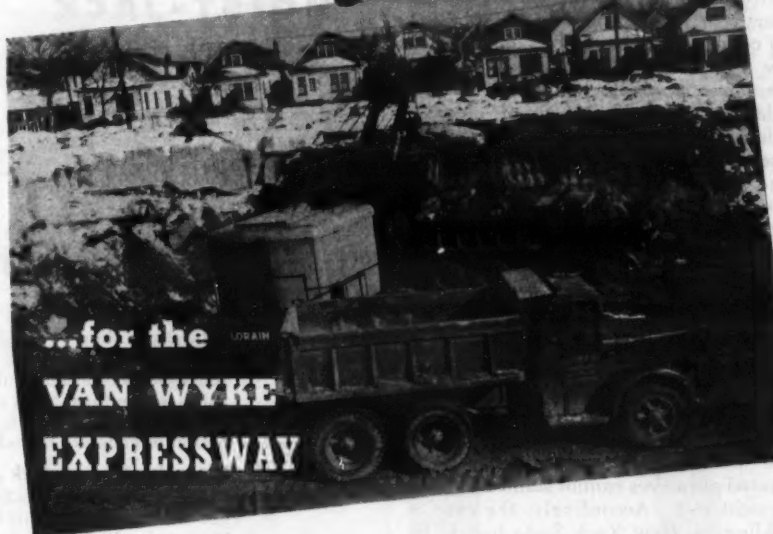
SET OF 4 SOCKETS.....\$24.00
SET OF 8 LEG EXTENSIONS.....\$24.00

Dealers — or F.O.B. MINNEAPOLIS
MILLER MANUFACTURING COMPANY
1406 W. Lake St. Minneapolis 8, Minn.



To leave an entirely unobstructed work area inside, this sheet pile cofferdam on the bank of the Mississippi River was constructed with circular concrete wales instead of cross bracing. A pump-well structure will be built inside it as part of a circulating-water intake for an addition to the Union Electric Power Co. plant at Venice, Ill. The cofferdam was designed and constructed by Western Foundation Corp.

Clearing the way



...for the
**VAN WYKE
EXPRESSWAY**

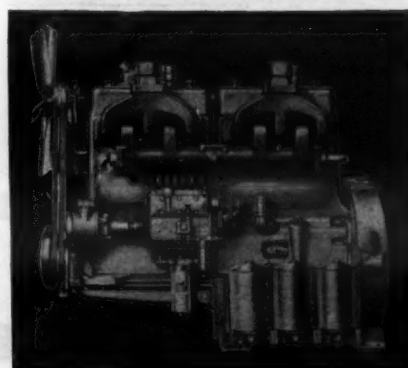
● Earth must move—before traffic can. So they're digging with Diesels—Waukesha Super-Duty Diesels! And at the rate the shovel is digging against this 16½-ft. embankment, that new New York State highway—the Van Wyke Expressway—will be completed in 1950 right on schedule.

The place is Long Island. The E. J. Varrone Construction Co., South Ozone Park, Long Island, N. Y., own the shovel. It's a 2-yd. 820 Lorain shovel—powered by the Waukesha Super-Duty Diesel Six.

It's a potent power producer—this heavy-duty, four-stroke cycle, overhead valve Diesel engine. With the exclusive patented combustion chamber used in all Waukesha Diesels you get unusual Diesel performance... clean burning with all standard "high speed Diesel fuels"... lively acceleration... high economy... easy starting... simpler maintenance. Send for Bulletin 1415.

WAUKESHA MOTOR COMPANY, WAUKESHA, WIS.
NEW YORK TULSA LOS ANGELES

WAUKESHA



Diesel
ENGINES

WAUKESHA Super-Duty Diesel
(Model 6-WAKD)—six cylinder, 6¼-in. bore x 6½-in. stroke, 1197 cu. in. displ.

How MUCH DOES IT COST YOU

...when a tension bolt breaks?

TIME LOST IS MONEY LOST . . .

and when you're on a tough schedule, a broken track tension bolt can tie you up anywhere from 6 to 8 hours. Don't take a chance with losses like this—keep a QUICK-ON Emergency Cap Tension Bolt on every Cat. Simple installation right on the job—gets you going again in 30 minutes. Retail for only \$12.50 . . . an insignificant cost when you consider the big saving in time and money. Order QUICK-ON Emergency Cap Tension Bolts today for all of your D8's . . . see your dealer or write us direct.

SILVER BOOSTER MFG. CO.
812 So. Flower St., Burbank, Calif.

QUICK-ON

TWO BIG REASONS for Keeping a Quick-On Emergency Cap Tension Bolt on Every Cat

1. Installed on the job in 30 minutes . . . minimum equipment lay-up.
2. Retail for only \$12.50 . . . Compare this with an average cost of an 8-10 hour breakdown, when the unfortunate happens and a tension bolt breaks.



Patent Pending

Emergency Cap
Tension Bolt

N. Y. Checks Scaling Caused by Chlorides

Concrete Highway Itself Provides Clue to Control Of Scaling Resulting From Salt Applications

† THE New York State Department of Public Works has been following the best "whodunit" tradition lately in its efforts to bring to justice a notorious concrete-highway killer—scaling. It even returned to the scene of the crime for its clues and went the FBI one better in its use of scientific laboratory detection.

Rivaling Erle Stanley Gardner's best, the complete account of the case, by B. T. Tallamy, N. Y. State Superintendent of Public Works, appeared recently in the "Journal of the American Concrete Institute" (March, 1949, pg. 513). The story begins with some background material.

Case History

"For the past generation it has been rather common practice throughout the northern states, including New York, to combat icing conditions on highways by spreading on them sand or other abrasives to which chemicals have been added"—calcium or sodium chloride. Plain portland-cement concrete pavements scaled and disintegrated under the action of these chemicals, and New York tried to solve the problem by constructing concrete pavements with natural-cement blends and with air-entraining agents to withstand the salt brine.

Unfortunately the problem didn't stay solved, for treated abrasives came to be replaced by the direct application of chlorides to meet the present-day demand for uninterrupted highway service. And pavements built to withstand the weak brines deposited by salt-treated abrasives cannot stand up under straight salt. Accordingly, the case of Scaling vs. New York State had to be reopened in 1947.

At first it looked discouraging. Methods of fortifying the concrete itself appeared to be exhausted. Surface protection to the pavement seemed to have failed. Nothing offered much promise

—until the Department thought to return to the scene of the crime, the highway.

At the Scene of the Crime

There it found that scaling was virtually absent on up-hill lanes where oil drippings from motor vehicles are heaviest—and that it was pronounced on down-hill lanes where less oil is normally deposited. From this Holmesian observation, it was no trick to deduce that if oil dropped accidentally protected the concrete pavement, then oil deposited purposely should accomplish the same result.

In the Laboratory

To test the effectiveness of motor oil

in resisting salt, the Department experimented in the laboratory with 200 2-inch mortar cubes made with three parts of Long Island sand and one part of cement. The control cubes, or standard of comparison, were made with straight portland-cement mortar. Others were made with a blend of one part of natural cement and six parts of portland cement. All were cured equally in a moist-air cabinet.

To duplicate the gasoline-diluted drippings from motor vehicles, SAE No. 10 motor oil was used throughout the tests. Twelve different treatments were administered to sets of both straight-portland and natural-portland cubes. These included one, two, and three brush-applied coats of straight oil; and one, two, and three brush-applied coats of oil diluted with gasoline in three ratios—90 to 10, 75 to 25, and 50 to 50. The diluted mixtures were introduced to facilitate penetration into the voids of the mortar. And the three degrees of dilution, it was hoped, would point to

the optimum ratio of dilution in field practice.

The cubes were then subjected to freezing and thawing tests to determine which oil treatment afforded the best resistance to chloride salts. Test specimens were placed in metal containers filled with a 10 per cent solution of calcium chloride, and the containers were set in a 5-ton freezing unit with a saturation.

(Continued on next page)

FOR BETTER HOSE SERVICE.. Use These Widely Adaptable DIXON PRODUCTS!



"AIR KING"

Quick-Acting, Universal Type

HOSE COUPLING

Famous for reliability and safety on indoor or outdoor air tool jobs. Quickly connected, and leakproof under both pressure and vacuum. Plain design—no parts to get out of order. Corrugated hose shanks are extra long. All locking heads—male and female, shank and threaded—are same size, in all hose sizes up to 1". Malleable iron (cadmium plated) or bronze.

PATENTED LOCKING ARRANGEMENT

For positive safety in services involving excessive twist or vibration. Connecting ends are fastened together in such a way that they cannot come apart until locking device is removed.



"DIXON"

SWIVEL CONNECTION

Turns freely with the hose under all conditions—the result of an entirely new principle of design and construction. Prevents twisting and kinking in lines carrying air, water, hydraulics, etc. Requires no lubrication or adjustment. For end or intermediate connections. Leakproof under all normal working pressures. Made in cadmium plated steel, in 1/2" and 3/4" I.P.T. sizes. Adaptable to "Air King" and other standard hose couplings.

Stocked by Manufacturers and Jobbers of Mechanical Rubber Goods.

IF IT'S A **DIXON** PRODUCT

IT'S DEPENDABLE

DIXON
VALVE & COUPLING CO.
Main Office and Factory: PHILADELPHIA, PA.
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TRUCK PARTS

for
Military Trucks

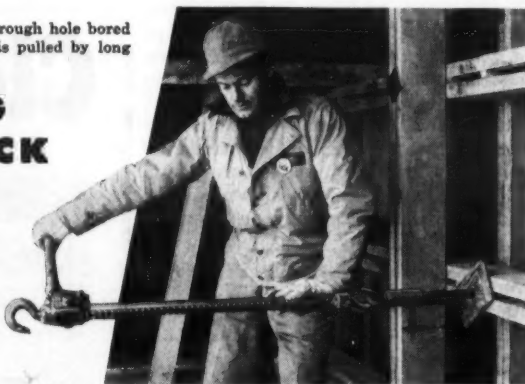


We carry largest stock in Midwest. All makes and models. LOWEST PRICES. Write stating model to

Wilensky Auto Parts Company
1226 No. Wash. Ave. • Minneapolis, Minn.

COFFING HOIST-JACK

*pulls
FORM RODS
quickly*



... SAVES TIME, MATERIALS

You can save valuable time and steel, eliminate expense of tubes by pulling form tie rods with a Coffing Hoist-Jack. With base against form, this powerful tool simply hooks onto tie rod, "jacks" it out—quickly, safely. No damage to rods, no tubes left in form, rods are ready to use again. Hoist-Jack has 44-in. lift, weighs 23 lb., has plenty of "pull" to overcome adhesion of concrete to rods.

It's a Hoist... a Jack... a Puller

With stand, the Hoist-Jack is a powerful high-lift jack. Without stand, it's ready for all hoisting, pulling, load binding jobs. "Safety-load" handle protects against overload. Two rugged models—2000 and 4000 lb. capacity. For complete information write for bulletin C5HJ.



COFFING HOIST COMPANY, Danville, Illinois

Quick-Lift Electric Hoists — Safety-Pull Ratchet Lever Hoists — Mighty Midget Pullers — Spur-Geared Hoists — Differential Chain Hoists — Load Binders

CUMMER ASPHALT PLANTS

COMPLETE PLANTS
FROM 45 TO 100 TONS
PER HOUR

PROMPT SHIPMENT ON
ALL SIZES

FEEDERS, STORAGE BINS
PUMPS - TIMERS
AND OTHER UNITS AS
REQUESTED

LITERATURE UPON REQUEST

CUMMER NEW PORTABLE DRYER

—45 TO 55 TONS PER HOUR HOT MIX—

FURNISHED COMPLETE WITH INDIVIDUAL MOTOR DRIVES, AND WITH ENCLOSED COLD ELEVATOR, FAN AND BURNERS (EITHER HIGH OR LOW PRESSURE).

CAN BE FURNISHED WITHOUT WHEELS AND AXLES.

COMPLETE TOWER UNITS, VIBRATING SCREENS, HOT ELEVATOR AND BINS, FURNISHED WITH DRYER IF DESIRED.

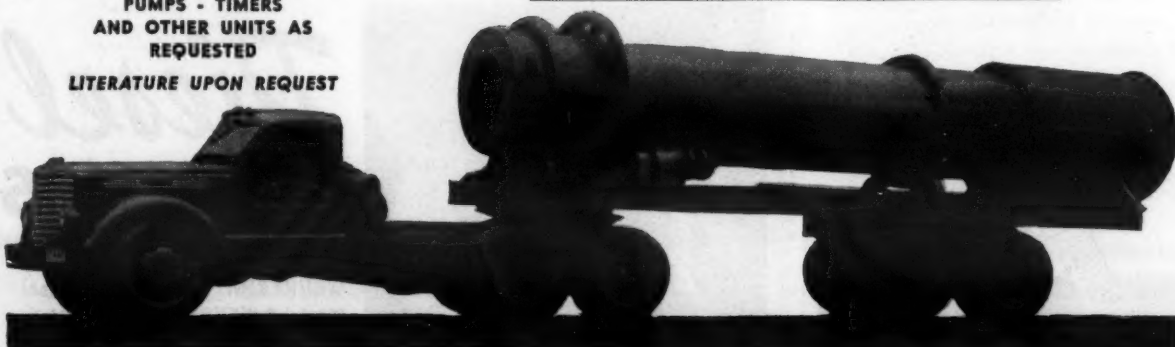
LARGER SIZES 80 TO 100 TONS PER HOUR (COMPLETE DRYING AND MIXING UNITS) ALSO AVAILABLE

THE F. D. CUMMER & SON COMPANY

BUILDER OF FINE ASPHALT PLANTS

CLEVELAND 15, OHIO

USA



urated solution of calcium chloride circulating around them. Specimens were left in the freezer all night at a temperature of about 10 degrees below zero, and thawed out during the day by circulating tap water.

This 24-hour cycle was repeated 25 times. After each group of 25 cycles, the samples were weighed to determine the amount of disintegration caused by the expanding salt brine crystals. These were the results:

After 100 cycles of freezing, untreated cubes of both straight-portland and natural-cement blend had lost 72 per cent of their mass—equivalent to total destruction. In contrast, cubes protected with one brush coat of No. 10 oil lost only 4.6 per cent of their weight; those with two coats, 3.6 per cent; and those with three coats, only 0.3 per cent!

As a result of these tests, the Department decided that one brush coat would give adequate protection, since after 25 cycles of freezing, the average loss was only 4.6 per cent. If pavements could be treated with oil coatings every couple of years for the first years of their lives, they might be expected to be immune to salt action indefinitely.

In the Shop

With this information on hand—and after determining that a field application of 1/20 gallon of 50/50 oil-gasoline mixture per yard would result in the absorption, by the concrete, of 1/40 gallon of straight oil per square yard of surface—the problem became one of devising a spray rig to do the job in the field.

A spraybar consisting of a 12-foot length of 1-inch pipe was mounted on the rear of a truck, and twelve No. 50 Tarrant nozzles were tapped into it at 1-foot centers. The spraybar was adjusted to a position 20 inches above the pavement. A 50-gallon open tank was mounted on the truck, and a 1-hp pump driven by a gasoline engine delivered the spray mixture from the tank to the spraybar at pressures of 35 to 40 psi.

The spraying mixture consisted of equal parts of Stoddard solvent—a mineral spirit used in dry cleaning—and petroleum distillate oil with an approximate SAE rating of 5. The solvent was used to reduce the danger from fire or explosions inherent in gasoline mixtures. The compromise loss of 5 points in SAE rating of the oil was not considered serious, as there is little difference in the viscosity and it resulted in a considerable saving.

In the Field

Operating at 2 mph, the equipment deposits this mixture at a rate of 1/15 gallons per square yard of pavement. This is 25 per cent more than the assumed optimum amount and is considered ample to offset the difference in body between the No. 5 oil used in the field and the No. 10 oil used in the lab.

Fifteen minutes after spraying, the oil is completely absorbed into the concrete and the solvent has evaporated so that normal traffic can be resumed. Pavements show no change in color after spraying, no slipperiness, no oil film. Total cost of one application with this equipment, including operational cost, is approximately one cent per square yard.

The equipment was developed so late

in the summer of 1948 that only 60 miles of concrete highway were sprayed. But crucial areas were photographed after spraying and will be photographed again this season to see how they stood up under winter ice-control treatments. As a further check they will be photographed again after succeeding winters.

Other Experiments

Even now the case against scaling is not completely closed, reports Mr. Tallamy. In an effort to achieve internal sealing that will resist salt brines, the Department is experimenting in still another direction with admixtures of asphaltic oils in concrete paving mixes.

Two asphaltic cut-back oils, RC-2 and MC-0, were used in constructing a 1,000-foot experimental pavement late in the 1948 season. Quantities of 2½, 5, and 10 per cent of the weight of the cement were added to the concrete mix after the first minute of mixing; then the entire batch was mixed for an addi-

tional minute.

Present indications are that quantities of asphaltic oils not in excess of 10 per cent of the cement by weight do not seriously affect crushing or tensile strength required in pavement work, and do not cause segregation or impair workability. However, the 10 per cent mix does increase the setting time by about 25 per cent.

On the same 1,000-foot experimental section, the oil-solvent protective spray was tried out as a curing agent. Results cannot be cited yet, but tests cores are expected to show that better resistance to salt action can be built into pavements by using asphaltic cut-back admixtures. It is also hoped that oil-solvent spray will prove to be an effective curing agent, imparting such benefits at the time the pavement is constructed as well as providing resistance to salt action later.

Mr. Tallamy adds one word of caution: pavements cured with asphaltic curing agents should not be sprayed

with the protective oil-solvent mixtures, because the solvent combines with the residual asphalt to make a slippery dangerous mass that does not dry readily.

(Concluded on next page, Col. 3)

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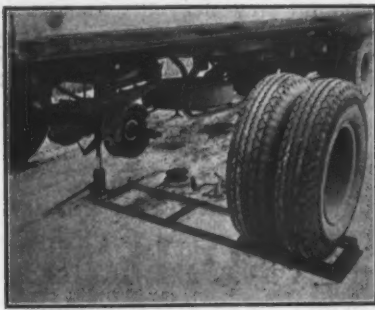
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Dual-Wheel Removal Simplified by Dolly

A special carriage to simplify the removal of dual wheels has been developed by Immel & Co. of Streator, Ill. It consists of a track and dolly, and is designed to save time and reduce the labor involved in tire-changing operations.

First the truck is jacked up about 4 inches so the dolly can slip under the wheels. Then the truck is lowered with the wheels resting securely in the dolly frame. Removing the wheel bolts permits the wheels to slide out easily on the dolly tracks. The Immel wheel pulley is constructed of steel angles and has a weight of 35 pounds. It will handle all sizes of wheels, the manufacturer states, and is available with a single-wheel attachment.

Further information may be secured from the company. Or use the Request Card at page 16. Circle No. 65.

Heavy-Duty Scales Feature Portability

Heavy-duty portable weighing scales are manufactured by The Thurman Machine Co., Scale Division, 156 N. 5th St., Columbus, Ohio. These include beam batching scales, truck-weighing scales, and the Sturdee wheelbarrow scales.

The Thurman batching scales are custom-built for any need. They can be furnished with the number of ingredient beams and in the capacities required. Various types of indicators, including ones with electrical control, are available.

The truck scale is especially designed for use by contractors who must move

from job to job; it requires no adjustments when moved, the manufacturer explains. Standard capacities and sizes include the 18-ton scale with an 18 x 8 or 22 x 8-foot platform, and the 25-ton scale with the same size of platform. The scale is constructed to withstand the full capacity of the truck and load with an ample margin of safety, says Thurman. Its steel non-skid runways are wide enough to accommodate dual-wheel trucks.

The weigh beams of the wheelbarrow scale are so notched that readings in fractions of a pound are possible. The scale has a tare beam for balancing the barrow, and weigh beams for use with one, two, or three separate materials. The weighing platform measures 30 x 42 inches, and has a capacity of 1,000 pounds.

Further information may be secured from the company, or by using the Request Card at page 16. Circle No. 90.

Light-Duty Engine

A light-duty gasoline engine has been added to the Ultimotor line by Uebelhoefer Bros., Inc., 848 Kensington Ave., Buffalo 15, N. Y. The Model 12 Ultimotor is rated at 1½ hp at 2,300 rpm and 2 hp at 3,000 rpm. It is 16 inches high and weighs 38 pounds. Among the features claimed for it are minimum vibration, precision machining, and rugged construction.

The Model 12 has a 2-inch bore and a 2¼-inch stroke. Piston displacement is 7.07 cubic inches. Ignition is provided by a high-tension flywheel-type magneto. A centrifugal-type governor is adjustable to the full power range, with provisions made for cable control. The Ultimotor is lubricated by a splash-oil system in combination with a centrifugal oil slinger. The engine features angular valves for a compression ratio of 6.13 to 1, and a built-in flywheel puller. Speed reducers in special ratios can be furnished.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 50.

WRI Managing Director

Frank B. Brown is named Managing Director of the Wire Reinforcement Institute, Washington, D. C. Mr. Brown has been in charge of structural concrete design for the Arthur G. McKee Co., Cleveland, Ohio.

N. Y. Checks Scaling Caused by Chlorides

(Continued from preceding page)

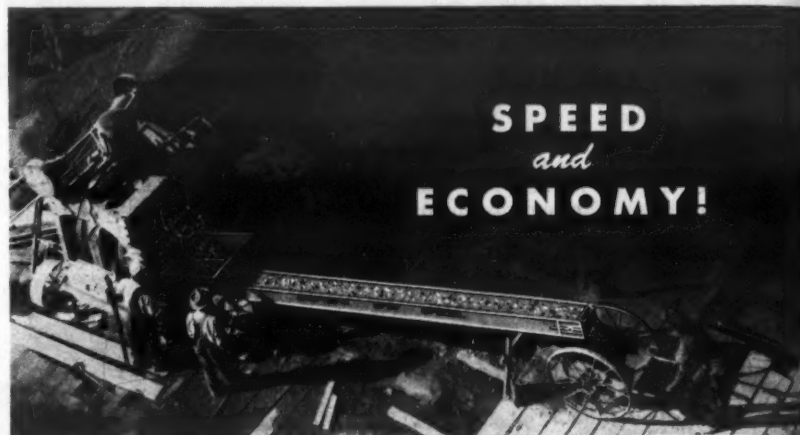
Conclusions

To date, these tests indicate that when an oil-solvent mixture is sprayed on concrete, the solvent evaporates upward leaving an oil residue which either fills or coats the myriads of tiny voids in the concrete. Where these voids previously soaked up a brine solution, now much of their capillary action is destroyed by the oil coating. Thus a de-

fense in depth has been established against the attack by salt solution.

In addition to keeping the brine out of the surface of the concrete pavement, the oil residue tends to reduce the size of the water particle and, consequently, its expansion upon freezing and resultant shearing stress. Also, when the voids are coated with oil, the deterioration caused by direct chemical action of alkaline solutions appears to be reduced.

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SUCTION HOSE Stock No. CM-203

Heavy-duty, smooth bore, wire inserted Suction Hose. Each length complete with I.P.T. couplings attached.

I.D. Size	Price Per 10 Ft. Length	Price Per 15 Ft. Length	Price Per 20 Ft. Length
1 1/2"	\$ 3.25	\$ 4.80	\$ 6.25
2"	4.00	6.00	8.00
2 1/2"	6.50	10.00	13.00
3"	8.00	12.00	16.00
4"	20.00	27.50	45.00

WATER SUPPLY HOSE Stock No. CM-200

Heavy-duty, flexible Water Supply Hose. Each length complete with I.P.T. male & female couplings attached.

I.D. Size	Price Per 15 Ft. Length	Price Per 25 Ft. Length	Price Per 50 Ft. Length
3/4"	\$ 2.00	\$ 3.00	\$ 6.00
1"	2.50	3.75	7.50
1 1/4"	3.70	5.55	11.10
1 1/2"	4.80	7.20	14.40
2"	9.50	14.25	28.50
2 1/2"	11.50	17.25	34.50
3"	16.00	24.00	48.00
4"	21.25	31.88	63.75

AIR HOSE Stock No. CM-201

Heavy-duty, extremely flexible Pneumatic Air Hose. For Air Tools, Compressors, Chippers, Riveters, Drills, Breakers, Etc. Desired couplings attached as shown below.

I.D. Size	Per 25 Ft. Length	Per 50 Ft. Length	Universal Quick Snap, Air King & Chicago Type Cplg.	Cleveland Bowes Type Cplg.	Boos Type Male & Female Couplings	Male & Female I.P.T. Cplgs.
1/2"	\$2.50	\$ 5.00				\$0.50 set
3/4"	3.00	6.00				.60 set
1"	3.75	7.50	\$1.50 set	\$2.00 set	\$1.60 set	1.00 set
1 1/4"	5.00	10.00	1.50 set	2.00 set	2.70 set	1.50 set
1 1/2"	7.50	15.00	1.50 set	5.00 set	3.00 set	1.75 set

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John O'Keefe, De Pere, Wisconsin contractor is using 5 high-speed, rubber-tired Tournapulls to speed completion of a new Wis.-Minn. Bridge Approach on U.S. 12 near Hudson, Wis. Job calls for borrowing blow sand from a cut at top of bluff . . . then drifting material into river at end of fill.

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To cut costs in the abrasive blow sand and assure high-speed production, O'Keefe put 3 of his veteran, rubber-tired Super C Tournapulls on the job . . . then added 2 new electric-control C Tournapulls to his fleet. "These new Tournapulls beat anything built yet," said Foreman Bob O'Keefe. You'll see why, when you take a look at their performance record.

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Loading down grade, O'Keefe's electric-control Tournapulls got 11 pay yards of blow sand in 75' . . . high-balled it to the fill . . . spread their loads and returned to top of cut every 6 minutes. That's 10 trips an hour per rig on the difficult 5000' cycle. Instant speed selection gave fast acceleration to 17.3 m.p.h. Constant-mesh transmission eliminated gear-shifting delays throughout cycle for higher average speeds. Giant 21.00 x 25 low-pressure tires, plus power-proportioning differential, kept C's from digging in on soft spots.

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Tournapulls climb grades as high as 12% to top of cut. Operators find it easy to maintain fast schedule because non-stop speed selection eliminates gear shifting delays, permits use of faster gear combinations.

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